ELP
JUNE 1, 1960

NEWS IN PERSPECTIVE

ECONOMIC CLIMATE

VIGOROUS UPSWING has put Gross National Product at a new high annual rate of $500 billion in the year's first quarter. Price boosts were modest. Most of the $17 billion quarter-to-quarter gain stemmed from an increase in the real volume of production. Fears of an early downturn appear to have been based on insufficient fact. More than half the overall gain in output was used, not inventoried. Though the rate of gain from the first quarter has slowed, there are no strong indications the economy will slip back.

CONSUMER BUYING remains a key to prosperity. The President's chief economic adviser, Dr. Raymond J. Saulnier, says "the signs are good" for the rest of the year. "The strength of consumer demand" is an especially favorable omen. Inflation seems on the wane, and the country is "moving toward a national wage pattern that will be consistent with a reasonable stability of prices."

MORE RESTRAINT in viewing the business outlook is expressed by the National ssociation of Purchasing Agents. As hey see it, 1960 so far has not quite ived up to its early promise. Furthermore, inventories are ample, "all items re available in plentiful supply and, in any fields, price competition has been uch more intense than was expected." On alance, however, more NAPA members report business increases than fall-off.

MANAGEMENT VIEW

"OUR MOST SERIOUS PROBLEM involves ..the gradual socializing of our business," declares EEI's Pres. Allen S. King n his message to the Institute's 28th nnual meeting (in Atlantic City, June -8). The gamut of program subject matter runs from "ability to serve" (Chas. E. Oakes) and "financing '60s expansion" (investors' panel) to "hardhead engineering" (James F. Fairman) and "promoting electric living" (R. G. MacDonald).

"WE'LL NEED $143-BILLION by 1980, concludes the EEI about the costs of expansion ahead in a new study of the industry's demand-and-supply outlook over the next 20 years. (See p. 47.) It's responsible, foresighted optimism that should stir the nation to a new appreciation of this business-managed segment of the U.S. economy. Meanwhile, EEI's current semi-annual power survey report confirms the conviction that "load growth has resumed normal proportions...so that by 1963 gross margins will have decreased to more normal levels." By the end of '63, total U.S. capability will top 200-million-kw, annual output will reach one-trillion-kwh, says EEI.

FUNDS FROM INTERNAL SOURCES, largely --that's the near-future plan of a number of investor-owned utility companies. Examples: Detroit Edison (whose Pres. Walker Cisler told shareholders "We expect for the next few years to raise about three-fourths of our capital needs through depreciation allowances, retained earnings and other sources."); West Penn (whose Pres. S. L. Drumm notes "no public financing is anticipated in 1960.")

HOW PUBLIC POWER PLANS is dramatically illustrated by the Los Angeles Dept. of Water & Power. Looking ahead to the year 2000, Gen. Mgr. Wm. S. Peterson foresees a need for a capacity of "not less than seven to eight million-kw," or four times present generating capability. To encourage electricity uses, he reports, sales promotion and advertising will engage 279 people spending $3.87 per customer annually by '60-'61--compared with 219 employees spending $2.34 per customer in '57-'58.

NEWS IN PERSPECTIVE

"WE PLEDGE OURSELVES to continue your partner in progress...," Iowa Elect. Light & Power Co. told voters of Cedar Rapids (in newspaper advertising) after they okayed a 25-year electric and steam franchise by a 65-1 margin on May 3 (compared with an 18-1 margin in balloting on proposition 23 years ago).

BEFORE 1968 A-POWER will become economic, believes Louis H. Roddis, Jr. The Penelec president told the recent EEI Financial Conference: "We are close to the time when the utility executive will be able to decide whether or not to build a nuclear plant on economic considerations alone."

NOW INTERCONNECTION'S PRACTICAL, utilities serving Minnesota's Twin Cities and Duluth announced on May 10. By 1963, an $8.3-million, 230,000-volt transmission line will join the Northern States Power and Minnesota P.&L. systems, taking advantage of the "diversity in the time of peak loads on the two systems...(to) leave a larger reserve of generating capability for exchange between them."

DOWN ON THE FARMS of the Carolinas, Reddy Kilowatt is an ever-busier "hired-hand." There, Carolina P. & L. Co. has nearly 150,000 rural customers, now served by more than 20,000 miles of t-and-d lines, "which CP&L has been building almost from the day it was founded in 1908."

PGE's REDDY, TOO--Beginning next October, the symbol of Reddy Kilowatt will go to work for the big West Coast utility, helping to sell customers of the combination company on "Living Better Electrically."

WASHINGTON INFLUENCE

RECLAMATION BUDGET of $301,479,000 has been asked for fiscal 1961 by Commissioner Dominy--up over $45 million from a year earlier. About half the increase stems from increased requirements for the Central Valley Project. One request is for almost $5 million in foreign currency held by the government. Reclamation plans to use this money abroad for scientific and research projects in addition to those performed in its domestic laboratories. About $1 million would be spent in fiscal 1961, with the remainder to be spread over a two-year period.

SWAP OF SERVICES between federal power administrations and private utilities is being encouraged by the House Appropriations Committee. Hope is that a system of clearing balances with power or services will cut cash needs, and hence lower appropriations. Reclamation Bureau finds it can make such clearing arrangements, and plans to do so.

REGIONAL POWER SYSTEMS, set up with the cooperation of "all forms of Electric utility enterprise" should be established, says Sen. Aiken (R., Vt.). Such organizations, he says, will be necessary to meet expanding power needs at the lowest possible cost.

ANTITRUST POLICY in price-fixing cases which might lead to treble-damage suits by states and local governments has been clarified by Asst. Atty. Gen. Robert W. Bicks. He says that the Antitrust Division will be flexible in seeking admissions of guilt from companies before consenting to settlements without trial. Insistence on an admission of guilt will "turn on a balance of the value of relief foregone or postponed as against the extent of injury" to a local government. Prompt filing of damage proceedings by the local government will have a bearing on the federal antitrusters' attitude. Where individuals are the "primary injured parties," the government probably will not insist on an admission of guilt before consent decree settlement.

HIKE IN TVA RATES may be necessary, although TVA Director Arnold Jones told the House Appropriations Committee that he hopes it will not be. Self-financing costs through bond issues could force the hoke. TVA's bond plans now call for sale of about $115 million, probably in two separate offerings of about equal size, over the next year. In issuing the bonds, TVA has "every intention to charge rates that will be adequate." TVA is "inclined to sell the first issue by competitive bids," though it has not rejected the notion of a negotiated underwriting. It has talked with four syndicates of underwriters about its offerings.

A number of Republican committee members protested TVA's role in displaying the lure of cheap power to bring industry into the state. Rep. Frank Bow (R., Ohio) pointed out that Tennessee, instead of being a "land of milk and honey" after 27 years of TVA, was listed as a principal distressed area asking for federal aid.

"SCAFFOLD FOR DEMOCRACY" may be under construction by the platform committee of the Democratic party, charge Sen. Goldwater and Rep. Wm. Miller, Republican party leaders. They warn that the "big brains" behind the drafting of the Dem's platform section on natural resources are Girard Davidson and Leland Olds, longtime supporters of Federal control over the electric power industry. Comments EL&P's Ralph Elliott (p. 52): "If Olds is n fact involved in this work (building platform for Socialism), it is no less han astonishing..."

SMALL-SIZE ATOMIC PLANTS must be eveloped to produce low-cost competitive ower, and "we must continue our diligent fforts to solve this problem," the AEC's hairman McCone told the Amer. Public ower Assoc. annual convention. Consumrs who obtain their power from relativey small plants (20- to-50-megawatts) ill also suffer from higher power costs, e said, as fuels become more expensive nd more difficult to obtain.

NO PRIVATE UTILITY BIDS have been eceived for construction of an organic-ooled reactor, says AEC, which has uthority to go ahead with federal contruction if it is technically feasible. wo public power groups--Los Angeles Deartment of Water and Power along with he Pasadena Municipal Light & Power epartment; and Western Farmers Electric ooperative, Andarko, Okla.--have proosed to build and operate conventional rtions of an improved cycle boiling ater reactor plant. It would produce bout 50,000-kw, as designed for the AEC.

A-POWER PLANT IN MICHIGAN is one step nearer. AEC, Consumers Power Co. and General Electric have agreed on bases for making contracts for a demonstration plant with initial capacity of 50,000 kw and ultimate capacity of 75,000 kw.

ATOMIC ENERGY REGULATION, in a preliminary stage of transition from the AEC to the states, may be exemplified by N.Y.

NEW BPA "PACKAGE OFFER" to Pacific Northwest industry requires the purchase of a kw of secondary power with every kw of firm power. A block of 300,000-kw is available. Pressure to sell increases as a Bonneville deficit of $5-million is in the offing, Congress has been told.

CALIFORNIANS RALLY together to protest the U.S. Supreme Court Special Master's ruling which would deprive the state of nearly one million acre feet of water a year from the Colorado River. California's $1.75-billion water development program may now get new support from all areas.

ACTION ON BPA-CALIFORNIA INTERTIE, proposed by Pacific Gas & Electric Co. and approved by the Interior Department, will not be taken immediately, Assistant Interior Secretary Aandahl has assured.

INDUSTRY SIFTINGS

ELECTRIC COMPANIES' ADVERTISING outscored the competition among the big winners in this year's Better Copy Contest, announced in mid-May at the PUAA annual convention. Only one gas utility finished in the top seven, led by Washington Water Power's performance with five awards. Four-time winners: Northern States Power Co., Philadelphia Elect. Co., So. Cal. Edison, B.C. Elect. Co., Hawaiian Elect. Co. and So. Atlantic Gas.

HOME BUILDER SUPPORT has been most successfully developed by four utilities, including the Appalachian Power Co., and Union Elect. Co., says LOOK magazine. Also at the PUAA conference, LOOK cited these companies, plus two Los Angeles gas companies.

MEDALLION-HOMES-FOR-'60 program of Hotpoint, an 8-point plan is underway.

NEWS IN PERSPECTIVE

New tool for Hotpoint selling this year is a "one-stop" kitchen planning kit, employing scale models of appliances.

JOBS-WELL-DONE SALUTES--To Philadelphia Elect. Co., a "Selling Philadelphia" (with modern advertising and promotion methods) citation, first annual award by the Poor Richard Club; to Virginia Elect. Power Co., a "Salute to Virginia Industry" citation, "in recognition of outstanding enterprise and significant contribution to economic progress of the Commonwealth," by the Bank of Va.

POLISH POWER EXPERTS are winding up a month-long tour of the U.S., including visits to 10 operating utility systems and three electrical equipment manufacturing plants. EEI-sponsored under State Dept. auspices, the visit is an exchange return on the U.S. industry visit to Poland a year ago.

LIBERALIZED DEPRECIATION--Do you plan to take it for income tax purposes for 1960? All public utilities in the State of California are now answering that question, based on the Commission's recent Decision No. 59926. This key order is discussed on page 52.

RECENT RATE ACTIONS--In Idaho, Washington Water Power got an $830,000 increase (90-percent of request), a 5.95-percent rate of return. Idaho Commission allowed: ave. rate base to June, '61, plus restricted surplus arising from accelerated amortization, but deducted electric plant acquisition adjustment reserve (with no element of fair value). In Ohio, Cincinnati G.&E. got $1.567-million (70-percent of request), a 5.5-percent rate of return. PUC allowed: on a reproduction cost new less depreciation rate base, tax deferral to be normalized, with adjustment in return to compensate for non-deduction of reserve.

SMITH MT. HYDRO PROJECT of Appalachian Power Co. got underway quickly last month after receiving a license ok from FPC. A $50-million undertaking, the "largest pump-storage installation in the U.S." will be producing 440,000-kw by 1962.

ELECTRIC YARD LIGHTS can be merchandised aggressively, too, Arkansas P. & L. finds. With a pay-for-it-on-your-bill campaign, the Little Rock utility is pushing an electric-eye model (on at dark, out at dawn), installed by contractors for $33.50.

HARDER TO SELL?--One survey reports that salesmen in the electrical products industry drove farther in '59 (ave.: 23,800 miles), will drive farther still in '60 (ave.: est. 25,000)--"because of increased competition for sales".

NO ALUMINUM PRICE SQUEEZE--That's what Reynold's Ex. V-P McConnell told a House small business subcommittee last month. And, he added, it is not true that three of the primary producers are trying to force the independent extruders out of business.

LOOKING AHEAD... FINANCIALLY

--From Irving Trust

About half of our original 1960 estimate of financing by electric and gas companies (with assets of over $35-million) will be completed in the first half of the year.

Principally electric utilities will have done about $879-million and principally gas utilities about $418-million. Scheduling of financing by gas companies has picked up in amount recently, bringing them to the half-way mark.

Financing for the second quarter looks about as follows (rounded to the nearest million):

	Completed	Coming	Total
Electric	$247	$215	$462
Bonds	196	180	376
Preferred	6	0	6
Common	45	35	80
Gas	$119	$165	$284
Bonds	75	154	229
Preferred	0	0	0
Common	44	0	44
Not Determined	0	11	11

New EEI Study Charts Rosy Future—

By 1980, U. S. Capability: Nearly 500-Million KW . . . But, Expansion Will Call for $143-Billion!

To reach the level of capability forecast for the nation's investor-owned electric utility companies by 1970 will require about $52-billion in new construction . . . and to double this productive capability again by 1980, the companies will have spent another $91-billion more for new construction.

Plans for quadrupling the electricity-producing capability of the nation's investor-owned electric utility companies in the next 20 years were reported in mid-May in a presentation of the results of a new Edison Electric Institute study on serving electricity requirements n 1970 and 1980.

The study predicts that by 1970 he electric companies will more han double their present power producing capability, reaching a otal of 263-million kilowatts, compared with 127-million kilowatts at he beginning of 1960. By 1980, heir capability is expected to reach nore than 492-million kilowatts, nearly four times today's total and lmost twice that predicted for 1970.

"To provide the greatly expanded ower supply systems of the future s going to require great sums of money," said EEI's Pres. Allen S. King. "Today, the electric companies have about $43-billion invested in electric plant and equipment. During the next twenty years, more than $143-billion will be required to expand the electricity supply systems, a sum more than three times the present investment."

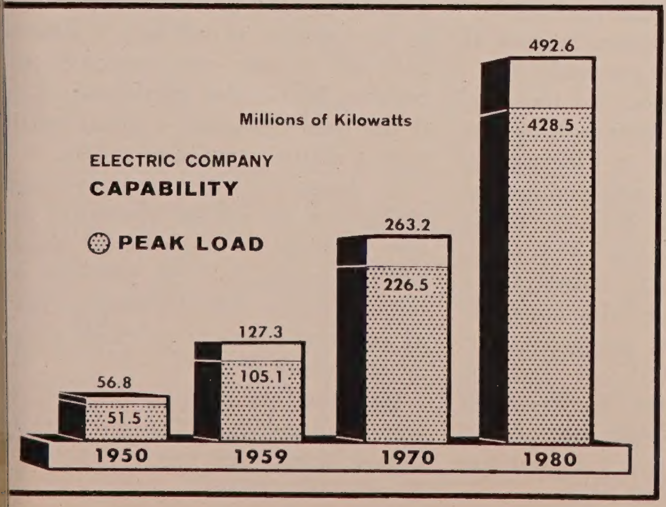
Mr. King pointed out that the electric companies have every confidence in their ability to attract funds in the free market to provide for the power needs of the future. "The growth we foresee is large, but it is in keeping with the pattern already established. Consider how the dimensions of our industry today would seem to the forecasters of twenty years ago, when our investment in electric plant was about $12 billion—less than ⅓ of today's total.

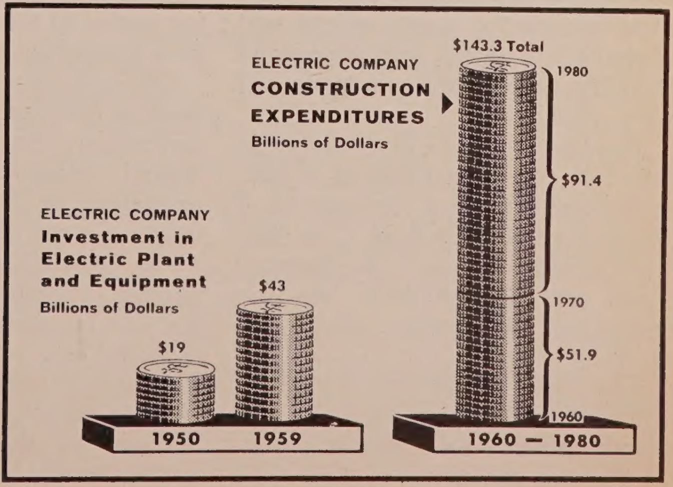
"We assume that the nation's over-all economic growth will continue at about the same rate as has been maintained since the end of World War II," Mr. King said. "Through the resulting development of additional funds in the market it is estimated that the requirements for electric system expansion can be furnished successfully. The trend is toward new heights of prosperity for the people in the United States by 1980, with some 68 million more Americans two decades from now sharing in that prosperity and contributing to it."

Per capita use of electricity, "one of the best indications of a nation's economic strength and the well-being of its people," Mr. King said, is expected to reach 7555 kilowatt-hours in 1970, compared to 4525 kilowatt-hours for every man, woman and child in the country in 1959. In 1980 the forecast is about 11,800 kilowatt-hours.

Mr. King noted that newspaper reports about electric power generation in the future will familiarize readers with a series of new numbers—trillions instead of billions of kilowatt-hours. In 1970, the electric companies expect their output to be about 1.2 trillion kilowatt-hours, more than double that of 1959. In the following decade, annual output will about double again, reaching an estimated 2.3 trillion kilowatt-hours.

Taking a long look ahead, the study predicts that by the year 2000, total electric power output for the United States will probably be in the range of six trillion to 10 trillion kilowatt-hours.





The study notes that steam plants using coal, oil or gas will continue to be the principal means of meeting the nation's electrical needs for many years to come.

Mr. King pointed out that hydro plants will continue in second place for some years, but by 1980 the electric companies' nuclear power plants are expected to have 39-million kilowatts of electric capability, to hydro's 25-million. Conventional steam capability should reach nearly 417 million kilowatts. In the next 20 years, the EEI President noted, steam plants should nearly quadruple in capability, hydro about double, while nuclear plants should increase 600-fold. Generators with 1-million kw of capability will be in use in some areas, the survey predicts.

This study was made by a task force of utility men with years of experience in assessing power needs and supplies. The nucleus of this 11-man task force was chosen from the Institute's Power Survey Committee which has been conducting semi-annual studies since 1947. The eight power supply regions as designated by the Federal Power Commission were assigned to the study group.

While this original study was being made on a regional basis, a national projection was being calculated by the Institute staff. These projections included capability, generation and dollar amounts for new construction.

The work done in the field for the most part involved studies of the plans and expectations of individual utility companies in the various regions. When the task force reports were completed, they were tabulated and compared with the nationwide projections. To the complete satisfaction—and I might add "delight"—of every one concerned with the project, the results tallied very closely.

The Institute staff projection was based on correlation studies of kilowatt-hour sales and components of Gross National Product. The task force study was based on estimated loads and kilowatt-hour requirements by FPC power supply regions.

The new Institute study on "Meeting Tomorrow's Power Needs" gives in its first part national data on the plans of America's electric light and power companies for meeting power requirements in 1970 and 1980. The second part of the study describes present and future developments by electric companies on a regional basis, dividing the country into the eight power supply regions as defined by the Federal Power Commission. (See accompanying chart.)

EEI Survey Shows Future Power Needs in FPC Regions

REGION	Capability (Millions of Kilowatts)		Production (Billion KWH)	
	1959	1980	1959	1980
I	32.4	96.9	136.3	452.3
II	29.3	96.4	137.1	485.3
III	14.9	81.2	68.1	364.5
IV	16.8	57.8	78.0	269.6
V	16.3	92.2	65.5	407.5
VI	1.7	7.7	6.6	37.4
VII	5.2	21.3	26.9	100.7
VIII	10.7	39.1	50.8	179.0

Georgia Power Co. Leads In Commercial Heating

"Georgia now leads the nation in the number of electrically heated commercial buildings," according to Georgia Power Company heating engineers, who report that the company is now providing electricity for heating 1,400 commercial buildings. New buildings containing all-electric heating installations are being added to the company's lines at an average rate of 55 a month.

The company's rates for its commercial customers have helped put Georgia at the top in electrically heated commercial establishments, according to J. E. Sweatte, who heads a corps of 42 electrical engineers specializing in adapting a variety of methods of electric heating for commercial purposes. Mr. Sweatte also pointed out that the increasingly downward trend of electric rates in Georgia has helped account for the state's leadership in the electric heating field.

Plant Maintenance Plan Saves Millions Annually

Estimated savings at $5-million a year are achieved through a new, engineering type of plant maintenance approach. Detroit Edison's Pres. Walker reported to the utility's stockholders in May. The new program utilizes specially developed tests and engineering studies to determine accurately the performance of turbine-generators, pumps, fans and other key power plant equipment. It also utilizes a centralized mobile maintenance force which moves from plant to plant for intensive maintenance work called for on the basis of the tests and studies.

The program has reduced tremendously the periodic dismantling of equipment which was a routine part of former maintenance procedure, Mr. Cisler explained. Also, it has made possible a great reduction of spare parts inventories.

A large mobile maintenance group can be moved promptly into any location on the Detroit Edison power system, and can perform extensive major maintenance projects at any one plant in as short a time as one week-end.

Savings being accomplished by this engineering type of maintenance procedure are estimated at $5-million a year.

ECONOMIC OUTLOOK

by A. C. FARMER
Economic Consultant

Business Activity, Bank Loans, and Private Debt

In the post-war period of World War II, there has xisted a definite tie-in between bank loans at the ommercial banks and net private debt, and between et private debt and general business activity. This s apparent from an inspection of the following tabuation:

Year	Bank Loans Commercial Banks	Change from Previous Year	Net Private Debt	Change from Previous Year	Federal Reserve Index Ind. Prod. 1947-49
	Dollars in Billions				
1945	26.1	+ 4.4	139.9	— 5.8	106
1946	31.1	+ 5.0	154.1	+14.2	90
1947	38.1	+ 7.0	180.2	+26.1	99
1948	42.5	+ 4.4	201.3	+21.1	103
1949	43.0	+ 0.5	211.4	+10.1	98
1950	52.2	+ 9.2	251.3	+39.9	113
1951	57.7	+ 5.5	282.8	+31.5	123
1952	64.2	+ 6.5	306.8	+24.0	127
1953	67.6	+ 3.4	329.7	+22.9	138
1954	70.6	+ 3.0	348.2	+18.5	130
1955	82.6	+12.0	402.3	+54.1	146
1956	90.3	+ 7.7	439.1	+36.8	151
1957	93.9	+ 3.6	464.9	+25.8	152
1958	98.2	+ 4.3	486.6	+21.7	141
1959	110.6	+12.4	529.0	+42.4	159

In the post-war period of World War II, the net rivate debt has averaged between 4½ and 5 times the ank loans at the commercial banks.

The expansion of the total volume of money in the conomy has been equal approximately to the expanon of the bank loans at the commercial banks. Comaring 1959 with 1946, the figures are as follows:

Year	Bank Loans at all Commercial Banks	Bank Deposits plus Currency
	Dollars in Billions	
1946	31.1	167.1
1959	110.6	251.2
Increase	79.5	84.1

The greater expansion of the net private debt is due the fact that important lending agencies lend the me money over and over again, collecting at the me time additional money in the form of interest the loans.

Insurance companies, for example, collect millions dollars each year from the individuals who have ken out insurance policies. This money in turn is t out on loan at interest, and each year the interest, d eventually the principle, flows back to the insurance companies. Also, as the volume of insurance expands, so also does the volume of premiums and the volume of money on loan. Other lending agencies follow the same procedure, and the result has been that the net private debt has increased in the post-war period at a rate of 10 percent per year in comparison with a rate of about 3.5 percent per year for bank deposits plus currency.

It is of interest to note that neither the increase in bank loans nor the increase in the net private debt has been uniform over the years. The increase, for example, of the net private debt, has been at an average rate of approximately $2.0-billion per month —but the rate has varied from a low of $0.8-billion per month to a high of $4.5-billion per month. The explanation is that the increase in the net private debt in any year is related to the increase in bank loans at the commercial banks in the same year. The latter largely is controlled by the existing policy of the Federal Reserve Bank in reference to tight money controls or relaxed money controls.

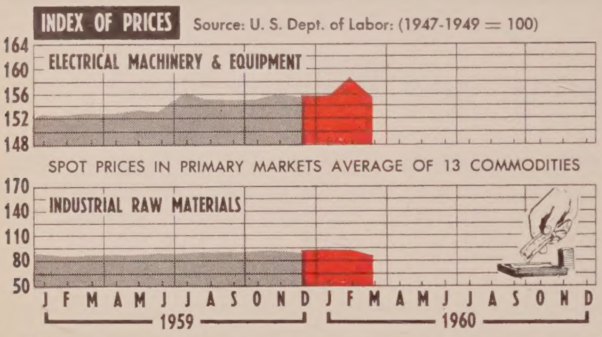
The present relationship between net private debt and the total volume of money in the economy is $529-billion to $251-billion. There is, however, the possibility that in about five years the net private debt may expand to $900-billion, while the bank deposits plus currency expand to $300-billion.

For a check-up on the stability of the American economy, a periodic review of the status of the net private debt in relation to the total volume of money in the economy is essential. The current check-up reveals a situation that is both encouraging and discouraging. It is encouraging to note that in America no critical developments are likely to occur in the next five years. It is discouraging to note that at the end of the next five years, America is likely to be faced with the most serious economic problems that it has encountered since the year 1929.

Now that the uncontrolled expansion of credit threatens the future stability of the American economy, consideration needs to be given by those in authority to the possibility of again suspending the business cycle, by the employment of means and methods which would expand the total volume of money in the economy without at the same time developing a greater percentage increase in the volume of net private debt.

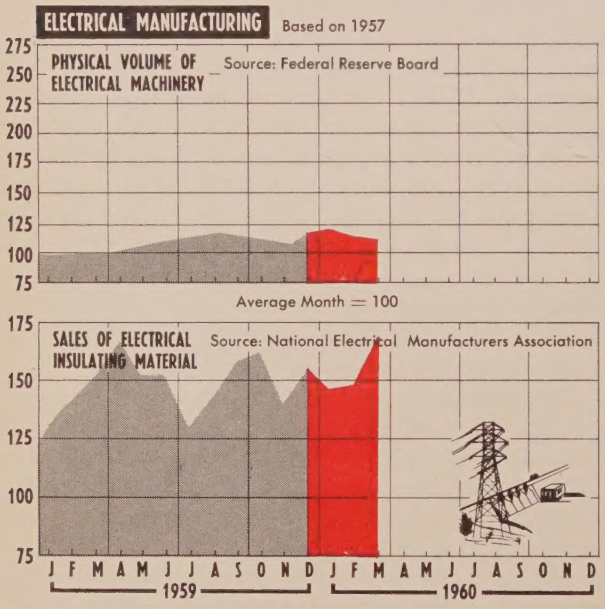
Expanding the volume of money would support business activity and prevent the recession that otherwise would develop, while controlling the expansion of debt would remove the possibility of the development of an ultimate crisis.

MARKETING GUIDEPOSTS



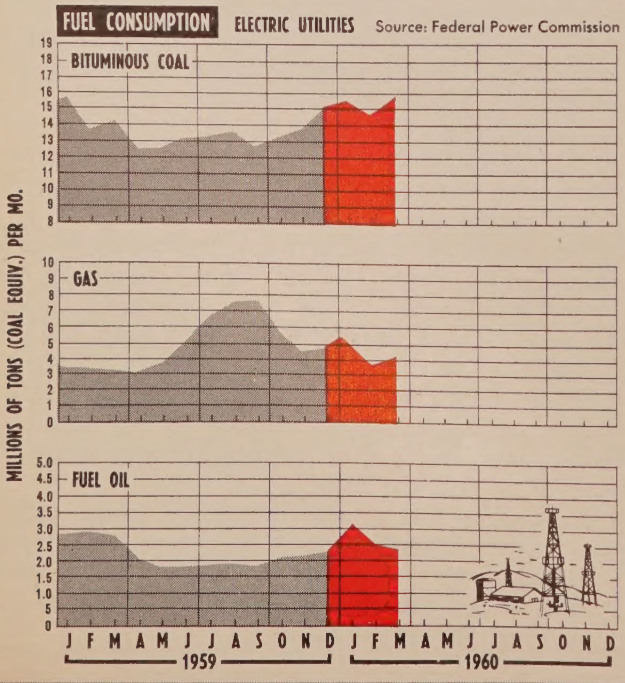
INDEX OF PRICES Source: U. S. Dept. of Labor: (1947-1949 = 100)

SPOT PRICES IN PRIMARY MARKETS AVERAGE OF 13 COMMODITIES

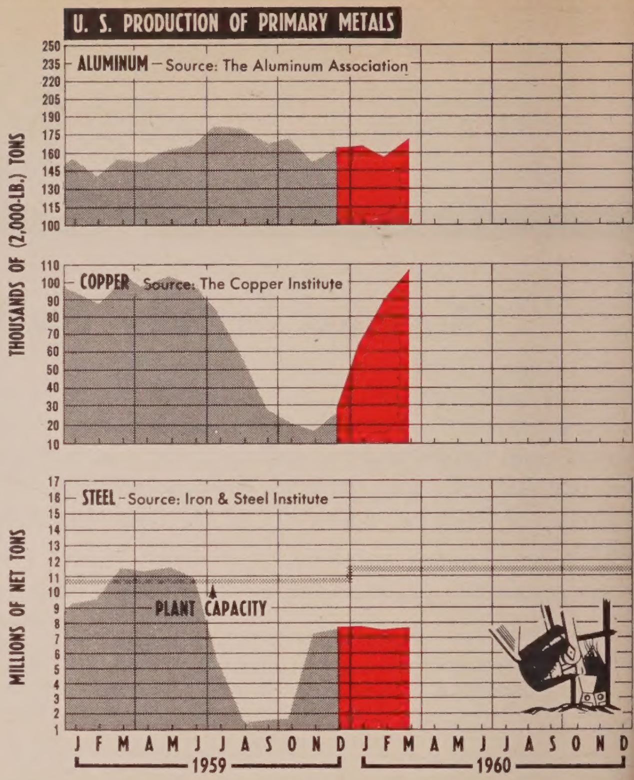


ELECTRICAL MANUFACTURING Based on 1957

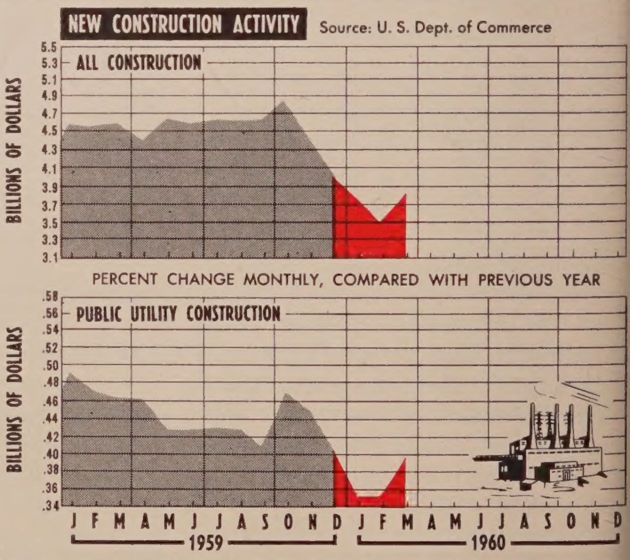
Average Month = 100



FUEL CONSUMPTION ELECTRIC UTILITIES Source: Federal Power Commission

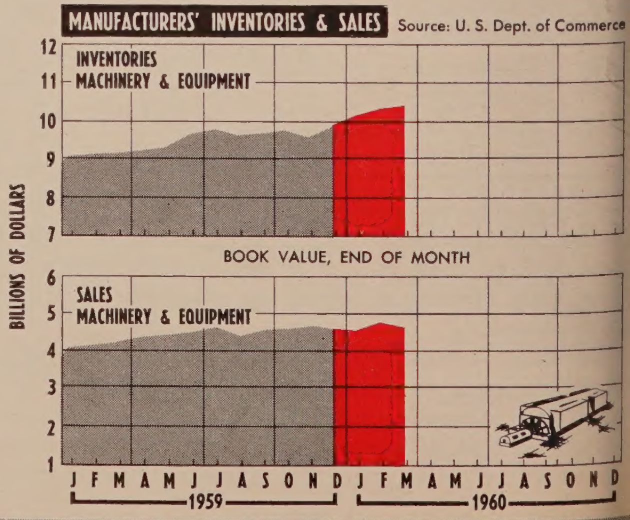


U. S. PRODUCTION OF PRIMARY METALS



NEW CONSTRUCTION ACTIVITY Source: U. S. Dept. of Commerce

PERCENT CHANGE MONTHLY, COMPARED WITH PREVIOUS YEAR



MANUFACTURERS' INVENTORIES & SALES Source: U. S. Dept. of Commerce

BOOK VALUE, END OF MONTH

WASHINGTON OUTLOOK

by **RALPH ELLIOTT**
Washington Editor

Platform or Scaffold?

Party platforms—those vote-beckoning word structures through which the opposing forces in presidential election contests supposedly bare their political souls—are in the blueprinting stage. Ordinarily such questions as who are the real architects of a platform, or what the finished product will look like, are hardly worthy of deep pre-convention concern. Historically, component planks have been broadened, watered down, or in effect even discarded, depending upon what was deemed to be politically expedient or "good for the country" in the light of post-election developments.

This year's platform of the Democratic Party, however, is going to be of far greater than usual significance. Already it is the subject of some hot, but thus far concealed intra-party warfare between Democratic "regulars" and some of the radical-liberal element of the Party organized in 1957 as the Democratic Advisory Council.

According to a joint statement issued last month by Sen. Barry Goldwater (R-Ariz.) and Rep. William Miller (R-N. Y.), the radical-liberals are high in the saddle and there is little doubt about the final outcome. The 1960 Democratic platform, they said, "will be masterminded by a few radicals with Leftover ideas from the past that have been either discredited or discarded. Taken as a whole, the philosophy of these men is that all problems of our society can be solved only by the Federal Government."

Noting that the platform committee will be headed by Rep. Chester Bowles, a New Dealer from Connecticut, the statement charged that the composition of the committee, its various advisory groups, and the reports already issued "clearly indicate that the Democratic Party's convention machinery has been taken over by a handful of radical throwbacks to the 1940's who are building a scaffold for the American people instead of a platform."

Then it named the policy formulators for the various planks to go into the platform. The listing could pass for a radical-liberal who's who.

In regard to natural resources, the two Republicans declared that Leland Olds and Girard Davidson will be the "big brains" behind the drafting of this section of the platform. Davidson, former Assistant Secretary of Interior under Oscar Chapman, is an advocate of public power and of greater federal control over all natural resources. Of Olds, the joint statement said:

"Olds, the former chairman of the Federal Power Commission in the 1940's, has been a radical-liberal all his life. He is a long-time advocate of complete federal responsibility for what he calls 'giant federal power and federal transmission lines' to give the Federal Government control over the entire electric utility industry . . .

"Because of his extreme radicalism, Olds and his ideas were soundly repudiated by Senate Democrats in 1949, when he was up for reconfirmation as a member of FPC. Lyndon Johnson, presently Senate Majority Leader, said of Olds at that time: 'In the twenties he scoffed at private property as just another myth; in the thirties he said our democracy had been made a sham; in the forties he has intimidated his staff, discredited his fellow Commissioners, fostered a smear on Congress and taken the law into his own hands . . . '

"Despite this rebuke, Olds still is accepted by various front groups and individuals who are working to attain his radical goals. Now his extreme ideas are being touted for inclusion in the Democratic platform. Reports on Natural Resources which already have been released by the Democratic Advisory Council and the Western States Democratic Conference clearly reveal the influence of Olds even to the point of including similar, if not the exact, wording of his past writings."

As to the statement's overall tenor, it should be noted in fairness that Goldwater and Miller are the chairmen of the Republican Senatorial Campaign Committee, and the Republican Congressional Committee; and that their statement was generously laced with the stuff that politics, particularly election-year politics, are made of.

It also should be noted, though, that there was no overstatement in the reference to Leland Olds. A review of the reconfirmation hearings at which Olds' radical background and extreme leftish writings (many of which showed up in communist journals) were exposed, and just a glance at some of his later expressions of political philosophy, removes any doubt that his handiwork will be directed toward building a platform for Socialism and a scaffold for Democracy.

If Olds is in fact involved in this platform work, it is no less than astonishing that a man once so completely discredited for his anti-American beliefs should still be advising and consulting in the Democratic Party regarding policy formulation. In this instance a significantly curious twist would be involved: Lyndon Johnson, now a prospective Democratic candidate for the Presidency, was chairman of the very subcommittee which heard the evidence that led to Olds' removal from government service.

It would seem that either the radical-liberals actually are in control of the Party, or that the Democratic "regulars," if they are still running the show, are not being too fussy about who their comrades are.

REGULATORY REVIEW

California Commission: Only Actual Taxes Allowed To Utilities Under Section 167

The California Public Utilities Commission ruled in a 3 to 2 decision that utilities under its jurisdiction who availed themselves of the provisions of Section 167 of the Internal Revenue Code of 1954 will only be permitted to use actual taxes, and that no normalization would be allowed.

The Commission, in noting that its ruling will apply only to the provisions of Section 167, and not to Section 168, showed only too clearly why it was going to disallow the former when it said that:

> ". . . accelerated amortization has a definite terminal date, free of any speculation, *whereas liberalized depreciation is a continuing matter without any definite future terminal date.*"*

The Commission noted that a number of witnesses took the position that not only was there a future tax liability, but that with normalization and the use of the tax reserve for accumulation of such deferrals, the ratepayers will not bear the additional cost of higher taxes when they occur. In this connection the Commission said:

> "*. . . It may be conceded that there is logical argument to support (such a) view, if one looks at this matter purely from the standpoint of accounting theory.** However, this is a subject which must be viewed as an overall proposition."

It would appear that the California Commission which has always been wedded to the accounting theory of rate making has now decided to discard it, since it did not fit its preconceived notions of the end result desired on the grounds that such " . . . considerations . . . did not lend themselves to abstract theory or barren logic."

The Commission then gave the standard (and erroneous) argument that because of growth of the California utilities the deferral of taxes will become permanent, and hence the normalization of taxes could not be used since that would be contrary to the Galveston decision of the U.S. Supreme Court.

The Commission also was seemingly in error when it said:

> "Wherever the matter of normalization of income taxes, based upon Section 167, has come before the courts, the normalization theory has been rejected."

It should be noted that the Illinois Supreme Court in the case of the Alton Water Company reversed itself and sustained the Illinois Commerce Commission's position on normalization, while on June 5, 1959, the Indiana Supreme Court upheld the normalization of taxes for rate making purposes in the case of the Public Service Commission of Indiana.

The California Commission also made the following observations which may seem to be completely unrelated to the facts of life when it said that:

> "A regulated company enjoys a distinct protection which the unregulated company does not; that is, *the regulated company may turn to public authority for the purpose of securing an increase in the price of its services or product, whereas the unregulated company must withstand the rigors of the law of competition.*"*

This is certainly a regulatory pipe dream as is witnessed by the need for rate increases during the depression of the thirties, when earnings were poor and when the so-called protection of the Commissions was noticeable by its complete absence. The fact of the matter is of course that the economic climate in which the utility operates furnishes much of the competition which the California Commission says applies only to non-regulated companies.

It would appear that the Commission had some mandatory flow-through provisions in mind when it said that: *"Surely, a reasonable argument in support of that contention could be made."** There is reason to believe that such a decision came close to being put into effect.

Dissent of Comm. Dooley

The dissent of Commissioner Dooley was extremely pertinent when he said that the use of normalization would not result in increased rates, and would on the other hand reduce the Company's need for external financing, and that this in turn would result in lower cost of money and the resultant rate of return. Commissioner Dooley noted that:

> "In this connection it should be noted that a number of the utilities have stated that they will use straight line depreciation for tax purposes in the event the Commission should decline to approve normalization.
>
> *"In my opinion, it is adverse to the public interest to cause the utilities to refrain from using the liberalized depreciation provisions of the Internal Revenue Code."**

Dissent of Comm. Fox

The dissent of Commissioner Fox is also well taken. In addition to making the same point as did Commissioner Dooley, that normalization would reduce the utility's cost of money and thus benefit the rate-

(Continued on page 87)

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* Italic supplied.

Here are the economics of electricity and gas for commercial kitchens. By properly selling the intangible advantages of electricity, Duke Power Co. believes that electric equipment can be sold over flame-type in spite of higher first cost and, in most cases, higher operating costs.

ELECTRICITY vs. GAS FOR COMMERCIAL KITCHENS —WHICH IS BEST?

By R. L. McCUEN
Commercial Sales Supervisor
Duke Power Company

THE DUKE POWER CO. has sold 138,036 kw of commercial ooking, water heating, heat pumps nd resistance heating from 1951 hrough August of 1959 with .A.R. of $2,711,249. This was argely accomplished by selling the ntangible advantages of electricity.

These items go hand-in-hand in ny Company's operation. A few ears ago we were promoting only ommercial cooking, leaving one of he toughest jobs—water heating to ur competition. We soon found hat when the gas boys got their oot in the door with water heating, hey were in a better position to ut in on the cooking load. In 1952, ve began to look around and found hat commercial electric water eaters in sizes over 120 gal were ot available, so we developed a uilt-up storage system.

In 1955, Duke Power decided to romote commercial package heat umps. Since the commercial promotion division had a trained organization, we were given this adlitional task.

With this, we were able to do the ntire commercial job electrically.

Commercial Cooking

In promoting electric commercial cooking we try to sell our prospect on the things that can be done electrically, pointing out particularly the things that electricity can do which cannot be done with flame fuels.

Since the first cost and installation of electric equipment is 50 to 75 percent higher than gas equipment, and in most cases operating costs for gas are lower, we must sell the intangible advantages of electricity:

1. Longer Life And Lower Annual Replacement Cost

On a recent job in Charlotte, the electric equipment net cost was $3,659.77 compared with $1,939 for gas—a difference of $1,720. We were able to prove to these people that electric equipment would outlast gas two to one. We furnished them names of customers whose electric equipment has been in use over 20 years. We also furnished them names of customers whose gas equipment has to be replaced in less than 10 years. On this basis, the annual replacement cost of electric equipment with 20-year life expectancy would be $182.99, whereas the annual replacement cost of gas equipment with 10-year life expectancy would be $193.95.

Editor's Note—This is the essential text of paper presented by the author before the ommercial Sales Committee of the Sales, dvertising and Public Relations Conference, f the Southeastern Electric Exchange held in ew Orleans, November 16-18, 1959.

2. Less Meat Shrinkage

In an operation which roasts 100 lb of meat per day, and using only five percent saving on shrinkage over flame-type fuel and a cost of 50 cents per pound for meat, the annual saving using electricity would be $912.50. We have many actual tests in which the savings on shrinkage runs from 10 to 20 percent. Under certain conditions the saving could be even greater.

3. Lower Frying Fat Cost

The electric fry kettle of today is unsurpassed by competition. It produces more product per pound of shortening, turns out better foods, and is easier to clean. The saving on frying compound will run as high as 50 percent compared with flame-type fryers. In an establishment the size of the example used in meat shrinkage, the saving on frying compound would be at least $50 per month. The economy story can be built around any type of operation, large or small, and may well be the clincher in the sale of the all-electric kitchen. Many operators in our area tell us that savings on shortening alone will pay for the fryer in less than one year.

4. Lower Air Conditioning Cost

For any combination of gas and electric cooking equipment, competition admits that 25 percent of the difference in Btu per hour input will be additional cooling load where gas cooking equipment is used.

For example: In a 100-seat restaurant with 425,000 Btu per hr gross input on gas equipment and 309,640 Btu per hr on electric, using a 50 percent diversity factor on the equipment, the input would be 212,500 Btu per hr gas and 154,820 Btu per hr for electric. If the equipment is installed under a properly ventilated hood, the American Society of Heating and Air Conditioning Engineers (now the American Society of Heating, Refrigerating and Air Conditioning Engineers) Guide suggests using 50 percent of hourly input for establishing the appliance heat load on air conditioning. The net added load would then be 106,250 Btu per hr on gas and 77,410 on electric. The net difference of 28,840 Btu per hr would require an additional 2.4 tons of air conditioning equipment. The first cost of this additional equipment would be $1,200 and the annual additional operating cost for air conditioning would be $43.00.

Competition claims that this is a small percentage of the total air conditioning and is of no importance. We disagree and point out that these items amount to $103 per year for the life of the equipment (20 years), or $2060, which is too large an amount to overlook.

5. Less Frequent Redecoration

We have case histories in our area which prove that redecoration is much less frequent in establishments using electric equipment, and that the cost of repainting will be from $900 to $1,000 on a 100-seat restaurant during the life of the equipment.

Total Saving, Electric Over Gas

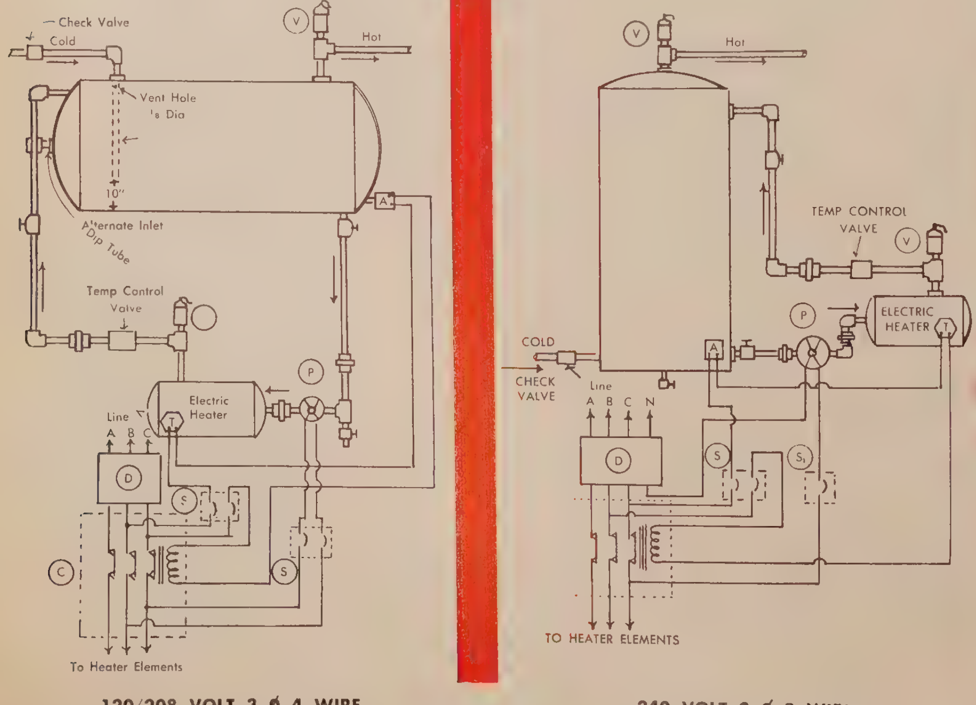
With these five points in mind, a 100-seat restaurant would realize the following savings by using electric equipment:

1. Cost of owning equipment
2. Savings on meat shrinkage (5%)
3. Saving on frying fat
4. Lower first cost of air conditioning
5. Lower air cond. operating cost
6. Saving on redecoration

These items will amount to an annual saving equalling the difference in the first cost of the equipment—enough to amortize the investment on electric equipment in slightly more than two years.

Other Intangibles

In addition, there are other intangibles that can't be calculated in



120/208 VOLT 3 ø 4 WIRE
WITH 120 VOLT PUMP

240 VOLT 3 ø 3 WIRE
WITH 240 VOLT PUMP

LEGEND

A AQUASTAT, set at 140°
T THERMOSTAT, set at 185°
V RELIEF VALVE ASME APPROVE AS REQUIRED BY NAT. STATE & LOCAL BOILER CODE
D SAFETY SWITCH
C MAGNETIC CONTACTOR
S 2 POLE CIR. BREAKER
S_1 1 POLE CIR. BREAKER
P CIRCULATING PUMP

NOTE: ALL EQUIPMENT AND WIRING MUST COMPLY WITH LOCAL & STATE CODES

THESE DIAGRAMS ARE DESIGNED FOR MOST ECONOMICAL CONSTANT TEMPERATURE WATER SUPPLY TO DISHWASHING EQUIPMENT

IF THE ABOVE EQUIPMENT IS INSTALLED ON DUKE POWER CO. LINES, THE WATER HEATING RATE OF $.0165 PER KWH FOR FIRST 100 KWH AND $.01 PER KWH FOR ALL OVER 100 KWH WILL APPLY PROVIDED THE STORAGE TANK CONTAINS TEN (10) GALLONS OF WATER FOR EACH KW INPUT OF ELECTRIC HEATER AND HAS BEEN APPROVED BY THE LOCAL COMMERCIAL REPRESENTATIVE OF DUKE POWER CO.

FIG. 1

dollars and cents which make electric cooking far superior to flame-type: labor savings; better prepared food; cooler, cleaner kitchens; better working conditions; lower maintenance cost; safety; and many others.

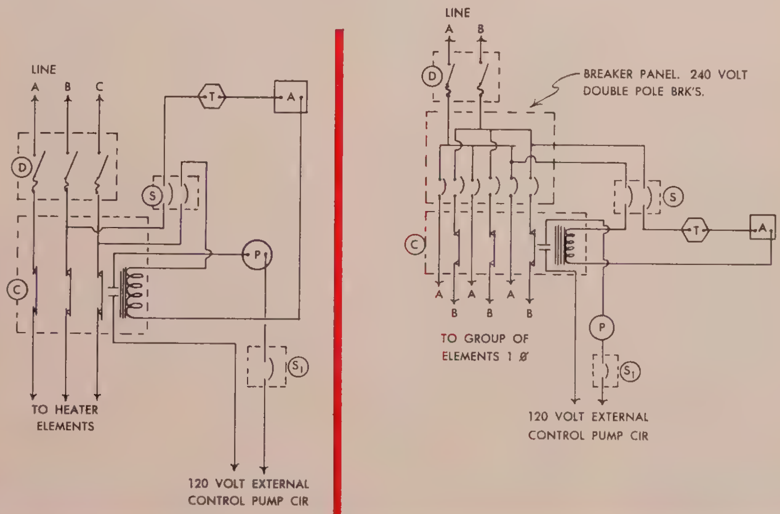
With proper use of the tools we have, we can sell electric equipment over flame-type equipment in spite of the higher first cost and, in most cases, higher operating cost. The advantages of electricity over gas are so outstanding that the prospect could not afford to use gas even if it were given to him free of charge!

Saving Per Year Using Electric	Saving in 20 Yr (Avg. Life of Equipment) Using Electric
10.96	219.20
912.50	18,250.00
600.00	12,000.00
60.00	1,200.00
43.00	860.00
45.00	900.00
$1,671.47	$33,429.20

Maintenance And Service

Our Company has a servicing agreement with most manufacturers of electric equipment and we do a large part of the service work, except where operators have their own servicemen or where a reliable servicing organization is available. Our service director re-

Electric kitchen equipment in the new Delmonico Cafeteria in Charlotte, N. C.


LINE
A B C
D
T
A
S
P
C
S1
TO HEATER ELEMENTS
120 VOLT EXTERNAL CONTROL PUMP CIR
LINE
A B
D
BREAKER PANEL. 240 VOLT DOUBLE POLE BRK'S.
S
T
A
C
A B A B A B
TO GROUP OF ELEMENTS 1 Ø
P
S1
120 VOLT EXTERNAL CONTROL PUMP CIR

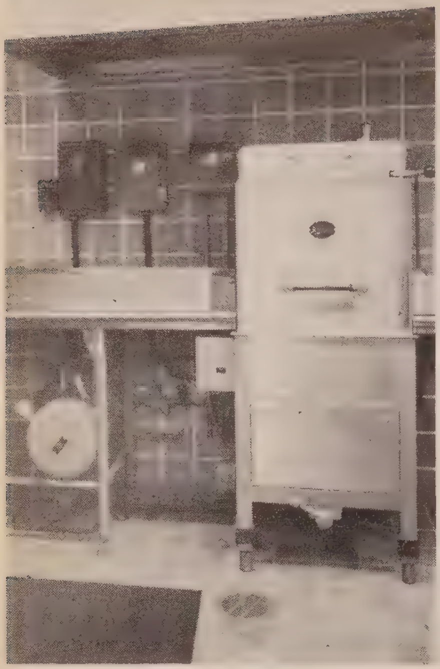
240 Volt 3 Ø 3 Wire Using Interlock for 120 Volt External Control Circuit.

Typical 240 Volt 1 Ø 2 Wire Using Interlock for 120 Volt External Control Circuit.

FIG. 2

Fig. 1—Wiring and plumbing hookup approved by Duke Power Co. for horizontal or vertical hot water storage tank using external electric heater.

Fig. 2—Suggested wiring hookup for horizontal or vertical hot water storage tank using external electric heater.



Booster heater (24 kw) is installed at the dishwashing machine in the Sedgefield School in Charlotte.

cently conducted a survey on several hundred appliances which shows that the average cost for material and labor for the past five years has been less than 50 cents per month per major appliance.

Water Vapors

It is a well known fact that in theoretically correct combustion, 1000 cu ft of natural gas, when burned, will liberate 2000 cu ft of water vapor, or 11 gal of water.

This excess water vapor adds to the discomfort of the employees, causes greater damage to walls resulting in more frequent need for redecorating. This water vapor also increases rusting of oven lining, burners, and piping, shortening their life and increasing maintenance costs.

Ventilation Requirements

According to Bureau of Standards Technological Paper No. 212, "Every cubic foot of natural gas requires 10.3 cu ft of air for complete combustion. This means at least 50 to 70 percent greater ventilation is required for the gas-fired kitchen than one using electric heat which does not burn the life-giving oxygen from the air, nor create excessive humidity as is done when combustion takes place."

Commercial Water Heating

The primary electric water heating system shown in Figs. 1 and 2 was developed so that the hot water requirements could be furnished from 200 to 1500-gal capacity. You will note that this system can be installed either vertically or horizontally.

With the use of a thermostatic valve, water that has not reached the predetermined temperature setting is not allowed to enter the storage tank. This assures proper stratification of hot water in primary storage tank at all times. This allows a draw off of approximately 75 percent of the storage tank capacity before mixing occurs.

Dishwashing Machines

Where there is a dishwashing machine, the supply of 140-F water is run to an electric heater located near the machine. This heater is set at 180-F for sterilizing rinse water. The fact that no venting is required is our best sales tool, because most dishwashing machines are located where venting is a problem unless expensive venting facilities are provided in the building. We stress this point.

When the cooking and water heating costs are combined, an average cost per kwh is less than 1½¢, which in most cases is competitive with flame-type fuels.

Electric Heat Pump

The electric heat pump economic aspect viewed from the all-electric consumer's vantage point provides year 'round comfort with complete owning and operating costs comparable to, or less than, those encountered when using any other types of energy-producing media known to man.

This is made possible by use of one machine which will provide both heating and cooling and will eliminate the possibilities of both a conventional heating and conventional cooling system operating simultaneously to provide comfort conditions in different areas of the same structure.

Tying this all up into a package and allowing it to snowball with the previously mentioned aspects of the all-electric consumer points to a much better economic picture than ever viewed before. Fig. 3 shows the load growth and the manpower utilized to produce it.

The steady growth of commercial electric equipment will continue if we all put our shoulders to the wheel and tell the electric story to all—sincerely and convincingly. If we do this, we will reap a rich harvest of new load for our companies.

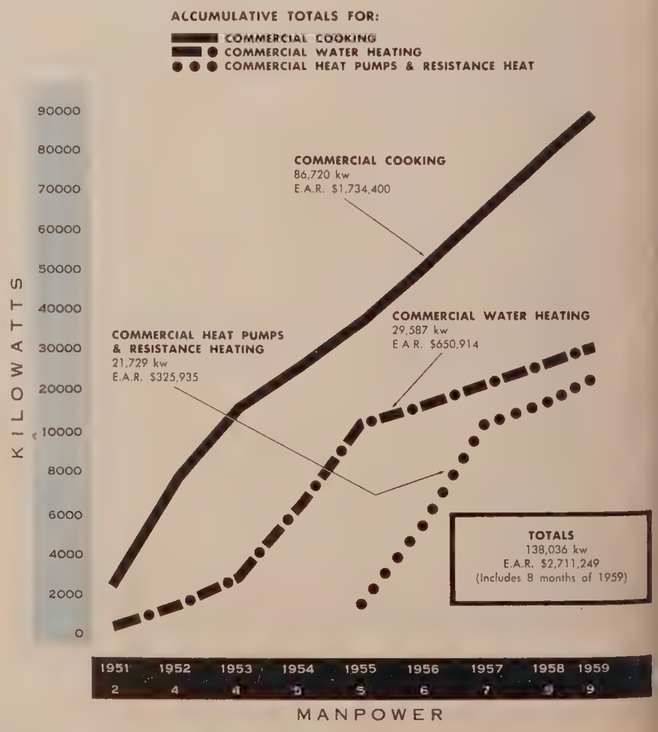


Fig. 3—Results obtained since 1951 shows load, E.A.R. and manpower growth over 8-year period.

Test Cross Arms for Dry Rot, Hot

Discovery of dry rot in some of the cross arms in a 26.7-kv line, led Connecticut Light and Power to test arms in the entire line. But the line could not be taken out of service. Here's how they did it:

The company's "Skyworker" truck was equipped with an air compressor and pneumatic trimming tools so that an air line was available in the bucket. Gerry Davis, division superintendent, was responsible for making a small air hammer weighing four lb, which was attached to an eight ft hot stick with a valve at the lower end of the stick and a rubber air hose, taped to the stick. A round hammer head was made to fit the air hammer.

By working from the "Skyworker" bucket, a lineman can run the hammer along the sides and bottom of each arm without coming near the live circuits. Sound of the hammer gives an excellent indication of the arm's condition.

Further checking of these arms revealed that the test method is accurate in indicating their condition. Results obtained by this method show that it could be used safely and accurately for determining the condition of timber arm braces, etc. on energized structures by using the proper hot-line stick with the air hammer.

Line Hose Washing Pays Off

At Long Island Lighting, the first full year of line hose and hoods washing has resulted in a net saving of almost $13,000 through reduced purchases of replacement hose and hoods. Prior to the washing program, a large percentage of hose and hoods were rejected as unfit for further use because excessive surface dirt did not permit a critical inspection.

Of a total 2300 units processed last year, 500 were rejected after cleaning for reason of physical defects. This rejection rate is 22 percent and compares to the 75 percent rejection rate experienced when rejections were made without washing. Cleaning of these items was done by a commercial laundry.

Malfunction Detector Protects Turbine

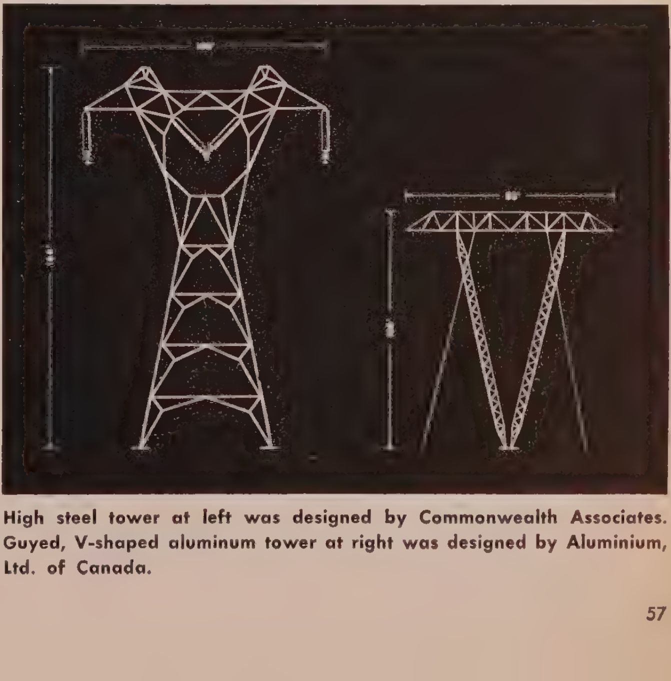
New York State Electric and Gas Company has installed vibration sensitive devices on all its hydroelectric turbines to either give warning of excessive vibration or to actually shut down the equipment to minimize damage that particle entry may cause. The Model 65 Vibraswitch Malfunction Detectors by Aeronautical and Instrument Div., Robert Shaw-Fulton Controls Co. are connected to time-delay control units so that an alarm will not sound should a foreign particle enter the turbine only to be immediately flushed out.

At NYSE&GC, the devices have detected metal fatigue which has started a separation of a turbine blade, have detected the presence of large pebbles in a turbine chamber and have shut units down prior to serious damage.

Finish Two More EHV Tower Designs

Aluminium, Ltd. of Canada and Commonwealth Associates have completed design of towers they were preparing for project EHV. Alcan, a new cooperator, brings the number of companies associated with General Electric in this research project to twelve.

Alcan's aluminum tower (slated to be No. 8 in the project) will be guyed and V-shaped. Masts will be 101-ft long and the crossarm, 98-feet above the ground, will be 93-ft long. The guyed 4500-lb Alcan tower will be fabricated by Michael Flynn Mfg. Co. of Philadelphia, Pennsylvania. Commonwealth Associates, Inc. has designed steel towers 10 and 17. Tower 10, one of the two highest structures in project EHV, will be 166-ft tall for a 2200-ft span across the Housatonic River, while tower 17 will have a more representative height of 123-ft. The narrow base, minimum-weight steel towers will be fabricated by the American Bridge Division of United States Steel Corp.



High steel tower at left was designed by Commonwealth Associates. Guyed, V-shaped aluminum tower at right was designed by Aluminium, Ltd. of Canada.

ECONOMIC CONDUCTOR SIZE FOR TRANSMISSION LINES

By HENRY F. SMALL,
Senior Engineer,
General Engineering Department
Consumers Power Company

A simple approach in determining economic conductor size containing only procedures usable by hand has been adapted for a computer program with highly satisfactory results.

ECONOMIC CONDUCTOR size for a transmission line can be guessed at or, at the other extreme, can be determined from elaborate calculations not warranted because most of the data used in the calculations has to be estimated or assumed. Consumers Power Company, in an effort to pursue a middle course, has adopted a procedure which proved so satisfactory that a computer program was developed to speed up the calculations, and this program is available to other users. Except for the additional labor, the same problem can be solved by hand after the proper decisions and choice of values, applying to either method, have been made.

A simple approach, known as Kelvin's law, states that the economical wire size is obtained when the cost of I^2R losses equals the cost of interest and depreciation on the conductors only. Overlooked, for simplicity, are variations in structure and insulator costs, other fixed charges, operating cost, maintenance, and the cost of reactive supply as related to allowable voltage drop.

The problem is fairly simple when stated this way: "The economic size of conductor for a transmission line is that size which will produce the lowest accumulated annual costs throughout the life of the line."

Basic Equation and Outline of Calculations

The following basic equation for annual costs involves only five terms but does require some serious thought regarding values to be used for each term. Setting up and obtaining several solutions for the equation represents the first of three steps in the economic comparison.

Step 1. Annual Cost = (A) Fixed Charges + (B) Losses + (C) Reactive Supply + (D) Operation + (E) Maintenance.

The term *annual costs* as used in this discussion is intended to have the generally accepted usage which includes, under *fixed charges,* the typical normal return on investment. Return to the investors, whether private or public, certainly is an important part of the *cost* of running a power business. Assuming for the moment that the correct values for (A) through (E) have been properly determined, the annual cost derived from each solution of the above equation yields one point on a curve which can be plotted to show "dollars per kw delivered" against selected values of "kw delivered." As shown in Fig. 1, calculations must be repeated for several values of kw delivered and for several wire sizes in order to draw the curves.

Step 2. Next, forecast the annual peak loading for the line in question for each year or for several periods of years throughout the life of the line.

Step 3. Multiplying annual peak loading by values of annual cost per kw selected from the curves produces the annual cost for one year. If periods longer than one year have been chosen, simply multiply by the number of years in that period and tabulate the annual costs for each period for each wire size. It is customary to include columns for accumulated annual costs so that year-by-year comparisons can be made for the first 10 years, end of 20 years, end of 30 years, etc., depending on the estimated line life. Tables I, II, and III show typical tabulations for comparing results.

Assuming that some minimum size has been determined as desirable, calculations will show profit (savings) for each period by using a larger size, also lack of savings by using too large a wire size for the same loads and periods analyzed. Thus, some conductor size midway in the range considered can be established as the economical size.

It may be desirable to consider only those conductor sizes which by experience have been established as compatible with a balanced structural design. For the 138-kv lines, Consumers Power Company uses 336-mcm ACSR on single wood poles, 795 mcm on two-pole H-frame structures or 1431 mcm on wood H-frames.

Factors Affecting Choice of Data

(A) *Fixed Charges*

For a given power system's financial setup, fixed charges must include cost of obtaining new money for the project in terms of (1) normal return to the investors, either private or public; (2) annual provision for depreciation (replacement of the line at the end of its life—say 30 years); (3) federal, state, and local taxes on the increased property value; (4) estimated income taxes on the expected return to the investors; and (5) insurance or equivalent allowance for unforseen damages. Estimated cost for a line includes right-of-way costs and cost of a circuit connection at each end. Reactive supply is covered elsewhere.

It is customary to use an "initial cost" to include any double-circuit towers with one circuit erected. Then, at such time as the second set of conductors is added, an "eventual cost" is used to reflect half of the total cost of a complete double-circuit tower line. That is, the line studied might be assumed to have only one circuit erected for the first 10 years and then half of two circuits erected for the remaining 20 years of its 30-year life.

Should the line consist of a new section attached to an existing line, it is desirable to include all the costs associated with the old and new portions. It is true that some of the values are the same in each equation but consistency in using all the figures helps to keep the calculations orderly.

(B) *Losses*

Annual cost of losses consists of two items: (1) Fixed charges on the investment in generating plant and other facilities to deliver power to the point where the line in question begins; (2) Annual cost of energy (kilowatt hour ¢ per kwh) to supply the losses. This includes fuel, fuel handling, personnel, supplies, maintenance, and all day-to-day costs of production.

In computing the annual loss, it is necessary to estimate the load factor which the line will experience initially and throughout its life (an average load factor may be used for the whole period without much error). From the "load factor" a "loss factor" can be derived which is applied to the losses at peak load to obtain average losses. For a recent new generator in the Consumers Power Company system, it has been determined that 70-percent load factor should be used.

Fig. 1—Annual cost comparison of three sizes of ACSR on the basis of power delivered by them.

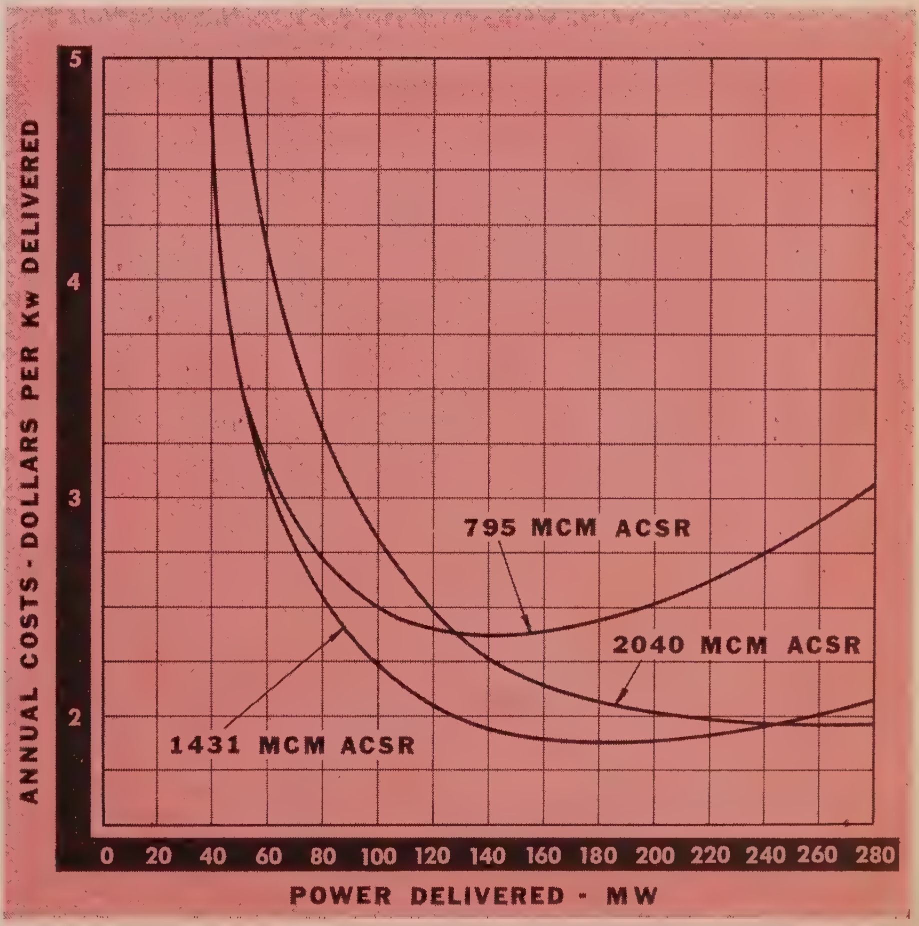


Table I

Line and Cost Data Sheet for Economic Studies

Line Name	Typical Line
Conductor Size	795 MCM ACSR
Sending End Voltage (P.U.)	1.035
Receiving End Voltage (P.U.)	.99
Line Length (Mi.)	27.0
Line Resistance (P.U./Mi.)	0.000597
Line Reactance (P.U./Mi.)	0.00386
Line Susceptance (P.U./Mi.)	0.001092
MVA Base	100.0
Loss Factor (P.U.)	0.55
Line Cost ($) (Initial)	$1,640,000.00
Var Cost ($/MVAR)	$12,000.00
Operating Cost ($/Mi./Yr.)	$98.00
Maintenance Cost ($/Mi./Yr.)	$98.00
Plant Cost ($/MW)	$172,000.00
Energy Cost ($/MW Yr.)	$28,800.00
Fixed Charges (P.U.)	0.15
Conductor and Line Identity	795
Zone Identification (0 = Zone I; 1.0 = Zone II)	0
NOTES	

This load factor results in a 55-percent loss factor as determined from analysis of hourly demand data over a typical one-year period.

Other studies have established that the average temperature of overhead transmission conductors in Michigan is in the order of 25 C rather than 50 C which at one time was thought reasonable.

In determining the correct dollars per megawatt of generating plant cost, a number of approaches are possible. Average cost of generating plant for a whole system including units constructed some 20 or 30 years previous, would not truly represent the cost of energy passing through a new line from a new generating station. On the other hand, the complete cost of a first unit in a station, including site development, harbor, coal-handling facilities, and many initial items built to take care of future units, would reflect too high a cost.

In recent Consumers Power studies, it has been customary to average the cost of the first two units in a plant after adding substation facilities and to deduct those circuit connections associated with outgoing lines. This average unit cost divided by the net output after station power, gives the cost per kw. (Circuit connections are included in the estimated line cost, so leaving them in plant cost would mean counting them twice.)

In effect, using the cost of the first two units is on the high side compared with larger units added later but it tends to offset the effect of inflation on later units.

(C) *Reactive Supply*

In the analysis of reactive supply associated with various conductor sizes, it is helpful to think in terms of "first zone" and "second zone" lines. "First zone" throughout this discussion means lines extending from a generating plant to the first load or switching terminal in a power system. "Second zone" lines are those connecting load or switching points within the system.

The reactive supply for a large power system may come from several sources. In the case of the first zone lines, reactive supply may come from a generator and may or may not result in any delivery of kvars to the load terminal, depending on the length of line, loading, and other circumstances. At the load terminal end of a first zone line, the reactive supply must usually be supplied by synchronous condensers or banks of capacitors. Then any kvars delivered from generation to the load terminal are counted as credits against capacitors or

Table II

Typical Line Economic Conductor Study—Comparison of Annual Costs 795 MCM ACSR vs 1431 MCM ACSR vs 2040 MCM ACSR

Year	Line Loading in MW	Annual Costs: 795 MCM ACSR Conductor $/Kw/Yr	Annual Costs: 795 MCM ACSR Conductor $/Yr	Annual Costs: 1431 MCM ACSR Conductor $/Kw/Yr	Annual Costs: 1431 MCM ACSR Conductor $/Yr	Annual Costs: 2040 MCM ACSR Conductor $/Kw/Yr	Annual Costs: 2040 MCM ACSR Conductor $/Yr	Accumulated Annual Cost: 795 $	Accumulated Annual Cost: 1431 $	Accumulated Annual Cost: 2040 $	Accumulated Savings: 1431 vs 795 $	Accumulated Savings: 2040 vs 1431 $
1960	65	3.53	229,450	3.49	226,850	4.58	297,700	229,450	226,850	297,700	2,600	(70,850)
1961	75	3.23	242,250	3.10	232,500	4.04	303,000	471,700	459,350	600,700	12,350	(141,350)
1962	80	3.10	248,000	2.96	236,800	3.82	305,600	719,700	696,150	906,300	23,550	(210,150)
1963	85	3.02	256,700	2.85	242,250	3.65	310,250	976,400	938,400	1,216,550	38,000	(278,150)
1964	85	3.02	256,700	2.85	242,250	3.65	310,250	1,233,100	1,180,650	1,526,800	52,450	(346,150)
1965	95	2.53*	240,350	2.29*	217,550	2.91*	276,450	1,473,450	1,398,200	1,803,250	75,250	(405,050)
1966	100	2.49	249,000	2.22	222,000	2.80	280,000	1,722,450	1,620,200	2,083,250	102,250	(463,050)
1967	110	2.43	267,300	2.12	233,200	2.62	288,200	1,989,750	1,853,400	2,371,450	136,350	(518,050)
1968	120	2.39	286,800	2.04	244,800	2.48	297,600	2,276,550	2,098,200	2,669,050	178,350	(570,850)
1969	130	2.37	308,100	1.99	258,700	2.37	308,100	2,584,650	2,356,900	2,977,150	227,750	(620,250)
10 Year Total			2,584,650		2,356,900		2,977,150	2,584,650	2,356,900	2,977,150	227,750	(620,250)
1970-1979	160**	2.40	3,840,000	1.89	3,024,000	2.14	3,424,000	3,840,000	3,024,000	3,424,000	816,000	(400,000)
20 Year Total			6,424,650		5,380,900		6,401,150	6,424,650	5,380,900	6,401,150	1,043,750	(1,020,250)
1980-1989	200**	2.54	5,080,000	1.88	3,760,000	1.99	3,980,000	5,080,000	3,760,000	3,980,000	1,320,000	(220,000)
30 Year Total			11,504,650		9,140,900		10,381,150	11,504,650	9,140,900	10,381,150	2,363,750	(1,240,250)

* Eventual cost curve used for 6th through 30th years. ** Average for ten (10) year period.

ondensers required for other reaons at that point.

Reactive requirements at each nd of a line for various loads can e determined from a large scale ircle diagram. The procedure for onstructing circle diagrams is decribed in "Power System Analysis" y Rothe, or similar texts on transnission line performance. When sing a computer, transmission line quations are part of the computer outine.

Reactive supply obtained from a enerator may cost from zero dolars per kvar for high power factor enerators, up to about eight dolars per kvar as the power factor is educed to 80 percent or less. If the ower factor rating of new generators is selected to satisfy emerency generator outage conditions ather than normal conditions, cost f reactive supply from generation uring normal conditions is zero.

On the other hand, reactive suply at the load terminal end may ost $10 to $12 per kvar for capaciors or perhaps $25 and up per kvar or synchronous condensers deending on the associated transormer and other facilities. In the onsumers system, switched caacitors can usually be installed at 5-kv buses in blocks of 7000 to 4,000 kvar.

For second zone lines, the kvar upply at both ends is assumed to ome from capacitors or synchroous condensers and is priced acordingly.

Reactive supply for any power ystem is closely related to voltage vels maintained to supply adeuate service. In a large power sysm, voltage levels are largely dermined by operating experience, ut it can usually be assumed that generator must, under heavy load onditions, operate at a somewhat gh sending voltage and that a wer voltage level will be acceptle at the receiving end.

For peak load conditions in the onsumers system, major generatg stations operate at 145 kv and a pical 60-mile transmission line ould have a delivery voltage of 0 to 133 kv, or eight to 10 percent ltage drop from the sending to e receiving end of the line. Durg light load conditions the generor would be reduced to 135 kv d most of the supplementary retive supplies turned off. Economic studies over a wide range of voltage conditions have indicated that eight to 10 percent voltage drop is reasonably economical for 60-mile lines originating at Consumers generating stations.

Table III

Typical Line Economic Conductor Study—Summary

Investment vs Savings

INVESTMENT	795 MCM ACSR	1431 MCM ACSR	2040 MCM ACSR
Initial Per Circuit Cost	$1,640,000	$1,775,000	$2,320,000
Eventual Per Circuit Cost	$1,430,000	$1,550,000	$2,050,000

	1431 MCM vs 795 MCM ACSR		2040 MCM vs 1431 MCM	
Additional Investment Per Ckt.	$	Years	$	Years
Initial	135,000	5	545,000	5
Eventual	120,000	25	500,000	25
Averages 10 years	127,500		522,500	
20 years	123,750		511,200	
30 years	122,500		507,200	
Accumulated Savings in Annual Costs by using Larger Conductor		*% Profit		*% Profit
At end of 10 years	227,750	17.8	(620,250)	(11.9)
At end of 20 years	1,043,750	42.2	(1,020,250)	(10.0)
At end of 30 years	2,363,750	64.3	(1,240,250)	(8.2)
Break Even Point	1st Year		Beyond 30 Years	

* Profit (or savings) per year on additional investment based on average investment.

In the case of second zone lines choice of voltage varies according to conditions. Different curves are calculated to fit typical conditions for each period throughout the life of the line as portions of lines are extended or connected in different combinations in later years.

(D) *Operating Costs*

Operating costs include annual cost of patrolling, keeping records, supervision, and any increased non-capital costs related to increased property in active service. Experience records are analyzed and estimates made to proportion costs for various types of line on a per mile basis. For 138-kv transmission lines costs ranging from $95 to $140 per mile per year have been used in recent studies.

(E) *Maintenance Costs*

Annual costs for maintaining a transmission line consist of material and labor involved in repairing damages, painting of towers, etc. They range from $85 per mile for small wire sizes on wood poles up to $170 per mile for large conductors on double circuit steel towers.

Accuracy Requirements

Operating and maintenance costs are usually minor items in the economic equation, so a high degree of accuracy is unwarranted. The largest item of course is Fixed Charges so it is important to be sure that all estimates of investment for each wire size are made on the same basis and are comparable. Losses and reactive supply are important items but minor variations in some of the estimates are unimportant if comparable figures are used throughout the comparison.

It may be of interest that in the Consumers 138-kv system the current construction program provides for 280 miles of 336-mcm single pole line, 75 miles of 795-mcm line, and 215 miles of 1431-mcm line. To prove in 1431-mcm, single 2040-mcm and twin 795-mcm lines were considered; 1431-mcm was shown to be most economical for the first 20 years.

HOW TO MAKE BETTER USE OF RIGHT-OF-WAY SPACE

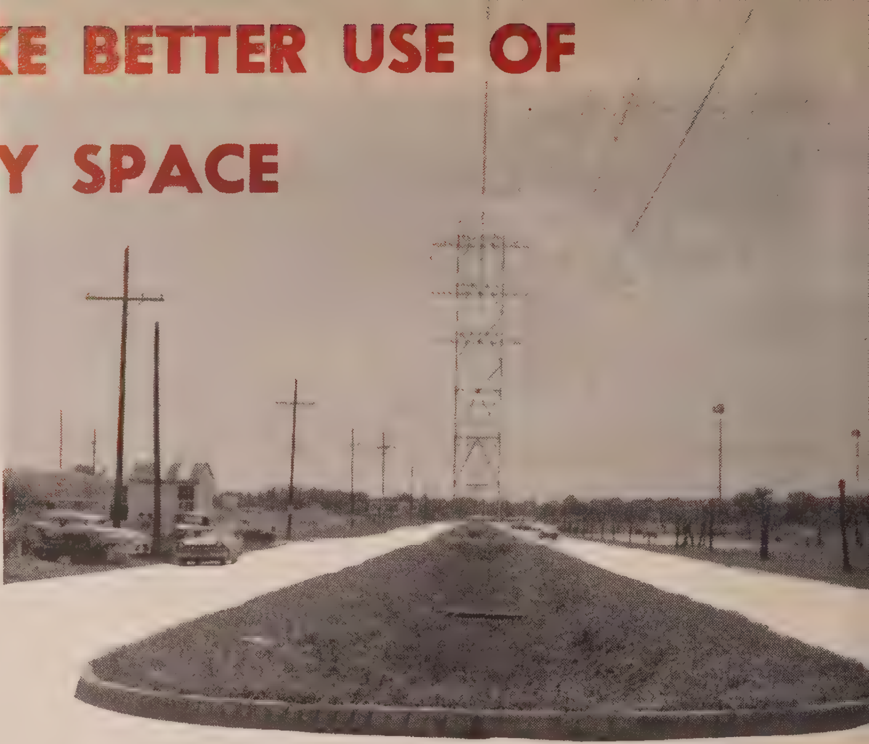


Fig. 2—Triple-circuit tower line located in middle of a boulevard eliminates expense of moving residence and business establishments. Triple-circuit provides for future growth.

Here are some of the methods Louisiana Power & Light Company finds successful in making mor intensive use of rights-of-way. Dressing up appearance of transmission towers may eliminate nee for going underground.

By E. L. LANCASTER
Transmission & Distribution Engineer
Louisiana Power & Light Company

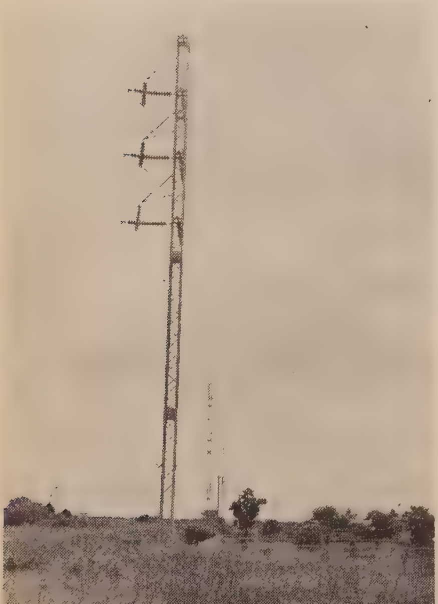


Fig. 3—Laced pole 2-ft square for carrying 115 kv down city streets. It overcomes public's objections to old black wooden poles and ugly wishbone crossarms formerly used. "Prettying up" towers may eliminate need to go underground.

THE NEED FOR USING available right-of-way space to its fullest is here. The demand for continuing to do so will be with us from here on out. This is predicted by almost every economic forecast encountered today.

What has brought about this need? Briefly, by taking a quick look at this country's growth and expansion, we will be reviewing, in part, some of the reasons why we should use available right-of-way space to its fullest.

Population Growth

We are all aware of this country's population growth and economic expansion. The estimated population in July, 1957, was over 170 million. By 1975, an estimate, covering the next 18 years, forecasts that the country's population will reach 221 million people. This represents a 30 percent increase in population.

To adequately care for this increase in population requires making available more jobs, more schoolrooms, more and better hig ways, more housing, and more hos pitals.

The electric utility industr plays a vital role in this growt It could be hampered should th industry fail to provide for ade quate electric power. Populatio growth and industrial expansio present many problems to an elec tric utility company—one of whic is securing rights-of-way. Mos utility people are familiar with th ever-increasing difficulties assoc ated with securing rights-of-way.

Load Forecasting

The five- and ten-year future loa forecasting studies, that utilitie are continually making, show tha new transmission facilities will b needed within the next five to te years. Almost invariably, the area requiring these additional trans mission lines in the near future ar areas of greatest growth. The lan value in these areas are doublin and tripling every few years. Thi has prompted a number of electri utility companies to obtain right of-way easements this year eve though they will not be needed fo five or more years from now.

Editor's Note—This article is adapted from a paper presented at the Engineering & Operation Section Meeting of the Southeastern Electric Exchange in Atlanta, Ga., October 15-16, 1959.

Acquiring Right-of-Way

In these areas of rapid develop-ient, it appears that acquiring ghts-of-way today for future use justified by merely comparing resent property values with what roperty values are estimated to e five to ten years from now. Also ne growth of the area may make it npossible to acquire right-of-way ecause of the dislocation of many eople and the resultant bad public elations.

Once the right-of-way is ac-uired, and even if it is an existing ght-of-way, careful plans should e made to make the most use of nis space.

An outstanding example of aking the most use of existing ght-of-way space is Connecticut ight & Power's "Operation Shoe-orn." This Company's construc-on crews worked closely with neir design engineers to squeeze our circuits for 115-kv operation ito an 80-ft right-of-way. The sual practice with most of us has een to provide 100-ft width right-f-way for lines in the 115-kv class.

The accompanying pictures show hat Louisiana Power & Light ompany is doing in its area of reatest growth. This area is adja-nt to the City of New Orleans. he city is served by New Orleans ublic Service, Inc. The Louisiana ower & Light Company and the ew Orleans Public Service, Inc., e interconnected and are both a part of the Mid-South System.

Along both banks of the Mississippi River, new industrial plants are being erected. The subdivisions and shopping centers that usually accompany plants of this type are springing up in the vicinity. In one location near LaPlace, Louisiana, plans are to build a complete city including churches, schools, shopping centers, and even a cemetery. This expansion puts a premium on the value of land.

New Orleans Area

Figure 1 is a map of the New Orleans area. Five power plants (located by squares), numerous substations (present and future, denoted by triangles), and present and future transmission lines are shown. The solid lines denote existing lines; the dash lines denote future lines. For simplicity, five areas are shown. The 1975 predicted load of each area is listed to indicate the need for the transmission line network as shown. Area five represents the New Orleans area proper. The other four areas are in the Louisiana Power & Light Company service area.

Loads predicted here are of considerable magnitude to Louisiana Power & Light Company. To serve loads of this magnitude requires providing heavy transmission facilities from the generating source to the load centers. Serving this system at the 115-kv level makes this class voltage appear to be distribution voltage rather than transmission.

Let's follow a few lines on this map:

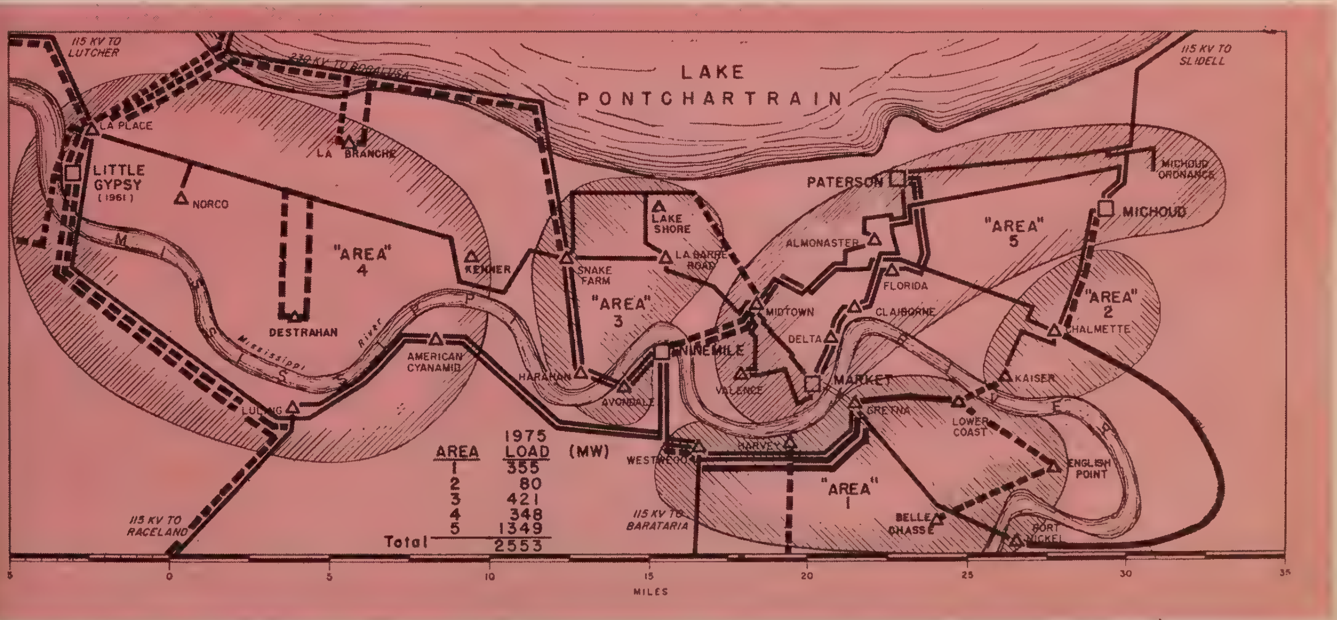
1. Ninemile Point-Churchill—eight 115-kv circuits—six with 666-mcm conductors and two with 1027-mcm conductors.
2. Westwego-Gretna—three 115-kv circuits—all at 1027-mcm conductor.
3. Ninemile Point-Snake Farm—double-circuit with 666-mcm conductor.
4. Snake Farm-Lake Pontchartrain—triple-circuit—one circuit of 1,468,400-cm conductor and two of 1027-mcm conductors.
5. Little Gypsy-Lake Pontchartrain will be a similar triple-circuit route as is Snake Farm-Lake Pontchartrain.

Conductor Sizes

A quick run-down on the standardized conductor sizes for use on transmission lines by the Louisiana Power & Light Company should help further to give a clearer understanding of what we are trying to do to more fully utilize our transmission facilities. The conductor sizes are:

1,468,000-cm ACSR—similar to 1500-mcm except that a portion of the steel core has been sacri-

Fig. 1—Map of New Orleans area showing present and future power plants, substations and transmission lines.



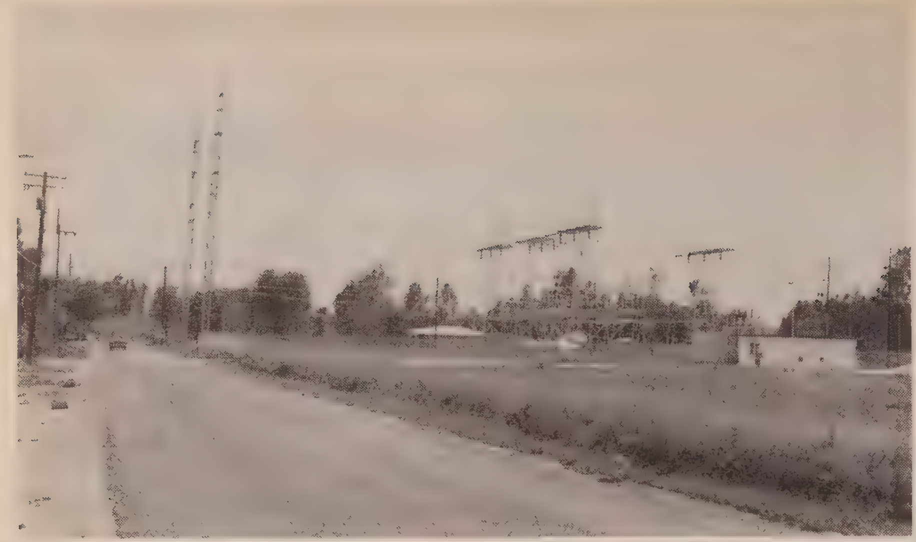


Fig. 4—Use of 2-ft square poles to conveniently tap existing line for an in and out circuit to substation.

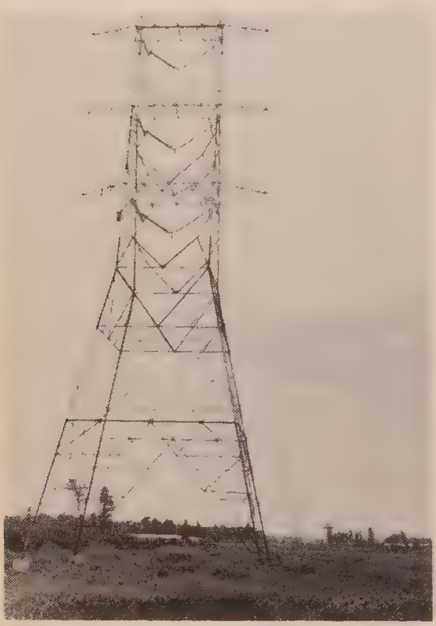


Fig. 5—Triple-circuit tower with middle circuit yoked for 230-kv operation. Two outside circuits, when installed, will be operated at 115 kv but can be operated at 230 kv if desired.

Fig. 7—Three double-circuit, 115-kv lines on wooden poles, with space for adding a fourth double-circuit line, all within a 300-ft-wide right-of-way.

Fig. 6—Triple-circuit tower line passing through a subdivision. Few objections have been raised.

ficed due to light loading conditions in our area.

1,027,000-cm ACSR – similar t 1033-mcm for the same reason a just given.

666,600-cm ACSR.

336,400-cm ACSR—All transmission lines for the past seven year built initially with this size conductor were constructed wit provisions for bundling at a future date by adding a secon 336,400-cm conductor.

In the area shown here, 666,600 cm ACSR has been the minimum size conductor installed on all line constructed since 1949. Had w used 1027-mcm as a minimum siz in place of the 666-mcm, already w could utilize this size to good advantage on some of the lines show here.

At 115-kv operation, the 1027 mcm ACSR will haul a useable 16 megawatts; the 666-mcm ACSR 130 megawatts; bundled 336,40 ACSR, 160 megawatts.

Generally speaking, 230-kv as transmission voltage is used to hau large blocks of power relativel long distances with maximum system stability and minimum losse In the New Orleans area, system stability is not a major consideration. The main considerations ar savings in losses and the therma limits of the lines. The savings i losses on the short lines in the New Orleans area are not nearly hig enough to pay the termination cost of the higher voltage. Except for 230-kv loop around the city, it appears that most of the transmissio built in the New Orleans urba area will be multiple circuit 115-kv

Middle Of Boulevard

Figure 2 shows a triple-circui 1,027,400-cm tower line located i the middle of a boulevard. These towers support three circuits. Thi location was made possible throug co-operative efforts between th Louisiana Power & Light Compan and the City Council of Gretna Gretna is located across the Mississippi River from New Orlean proper. Only two circuits at present are operating at 115-kv; th third circuit is operated at 13.8-kv

By yoking the middle circui with side-tension insulator assemblies, all three circuits can operat at 230-kv. This type structure i ostly when compared to towers rected just a few years ago. The undations are especially costly ue to the narrow width at the ase. In this vicinity, right-of-way accommodate facilities of equal apacity could be had only at the xpense of dislocating residences nd business establishments. Construction of a line other than triple-rcuit would not be providing lded capacity to take care of future growth.

Another line similar to Fig. 2 riginally was single-circuit "H" ame construction. Either side of e right-of-way was woods and no reet existed. The right-of-way was otained by our company in the late 0s, but subsequently given over the City of Gretna for their use rovided it did not interfere with e maintenance and operation of e line. Three years ago the single-rcuit "H" frame line was replaced a triple-circuit tower line. At out the same time the line was uilt, the City of Gretna opened up boulevard down the right-of-way. oth parties have benefited by this rangement.

Square Pole Line

Figure 3 shows the 2-ft square ced pole that we are using in wns and cities for carrying 115-kv rcuits down city streets. This wer was designed primarily to ercome the public's objections to ructures consisting of old wooden, ack poles and ugly, wishbone ossarms that we have used in the ist on city streets.

Here it will be noted that all the nductors overhang the street on e tangent structure. The maxium bending moment of this structure at the ground line is 407,000 lb. This permits a maximum span ngth of 600 ft using 1,027,000-cm CSR conductors. About 300 ft is e maximum span length permisble using pine poles with this size nductor.

The combined effect of greater an lengths and the lesser silhoute that the 2-ft square pole prents helps remove to some extent e objectionable appearance of the orter-spaced wooden-pole line.

Dressing Up Towers

Presently the thinking of our management is that added money spent on "dressing up" the appearance of transmission towers in urban areas may well be the thing to do to keep us from having to go underground. There are substantial savings in construction cost of overhead versus underground lines. Money spent for "prettying up" urban transmission lines can easily be justified from this approach.

Figure 4 demonstrates the use of these small poles in another way. A 115-kv line of wishbone type construction was erected on this street in Kenner in 1946. Just this year it became necessary to locate a 115/13.8-kv substation in Kenner. This photo illustrates how the 2-ft square poles were used to conveniently tap the existing line for an in and out circuit to this substation.

Figure 5 shows a triple-circuit tower with the middle circuit yoked. This is for 230-kv operation of the circuit. The two outside circuits, when installed, will be operated at 115-kv; however, they, too, can be operated at 230-kv.

Property Not Depreciated

Figure 6 shows the triple-circuit tower line passing through a subdivision. To date very few objections have been raised. The value of the property has not been depreciated by its presence. This was substantiated by comparing values of real estate here against comparable real estate values at other nearby locations.

Wooden Pole Structures

Figure 7 shows three double-circuit 115-kv lines carried on wooden-pole structures with space for adding the fourth double-circuit line. These double-circuit tower lines are on 60-ft centers and all four double-circuit lines are placed within a 300-ft wide right-of-way. A double-circuit line of this type taken singularly requires a right-of-way 120-ft wide. The 120-ft-wide right-of-way for this type construction offers the same clearances as does a single 115-kv line on a 100-ft wide right-of-way. The Louisiana Power & Light Company has used this type double-circuit construction to good advantage in the New Orleans area.

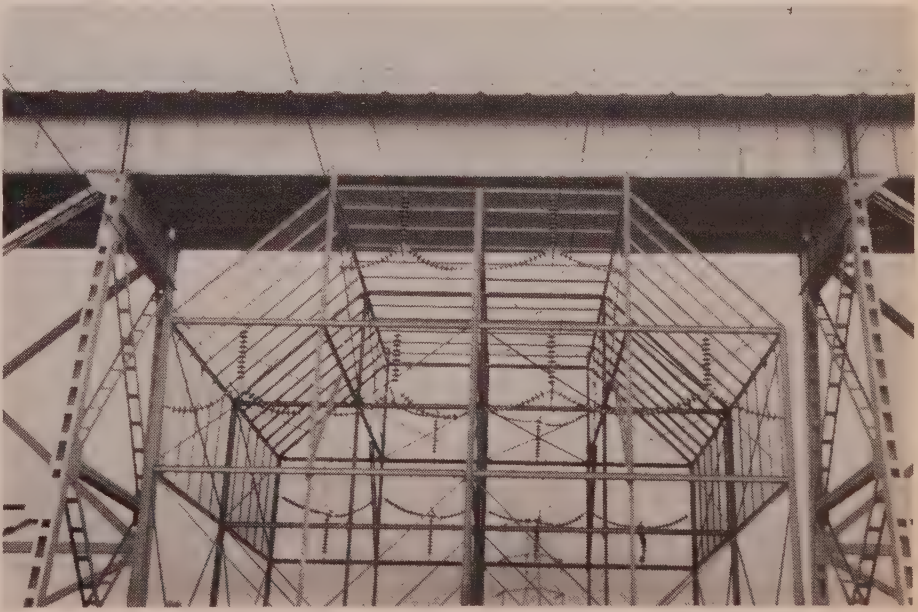
A tangent structure of this type costs about $850 per structure. With large conductors, 10½ structures per mile are required. Using double-circuit steel towers on a comparable basis would require 6½ towers to the mile. However, a tangent double-circuit steel tower of this type costs about $2500. The appearance of the steel tower is less objectionable than the wood structure. Where appearance is not of prime importance, the use of the double-circuit wood-type construction can be built at some savings.

Underbridge Problems

Figure 8 demonstrates how a particular problem was solved on a double-circuit 115-kv line. It was

(Continued on page 74)

Fig. 8—Here's how a double-circuit 115-kv line was built under approach to Mississippi river bridge near New Orleans. Canopy of mesh wire over top and partially down each side provides adequate protection for bridge maintenance personnel.



Aim: "Progress Through Performance," But

Measuring Performance Poses Problems For EEI Purchasing and Stores Group

"Progress through Performance" is a slogan which could inspire almost any group, and last month it undoubtedly did play a part in the success of the 13th annual meeting of the EEI Purchasing and Stores Committee. The utility buyers and storesmen left their conference in Philadelphia still wrestling with the complicated challenge: how *do* you *measure* performance?

No new challenge, performance measurement has occupied the time and thoughts of many members of this EEI committee almost from the beginning of its establishment a dozen years ago. Stores performance measurement received the particular attention of this conference, with over 100 in attendance participating in a dozen separate "round-table" discussions aimed at identifying common-denominator indicators of how well these 90-plus companies perform in the stores field.

When all but one of the groups, segregated by similarity of company size (or number of customers served), agreed they had failed to find yardsticks that would permit comparisons between companies, they were chided by Chairman-elect Robt. Gear. Said the Commonwealth Edison director of purchases: "We are too complacent. Your management will look for ways to measure your performance, so you'd better find one!"

And, one of the committee's discussion groups says it can be done. Its leader, C. L. McCamey of the Cleveland Elect. Illum. Co., promised to continue the effort. While wide differences were reported in the use of many ratios and comparisons for internal company measurement, Mr. McCamey expressed the view that intra-company comparisons might still be made using only several indicators most common to the largest number of utilities.

The workshop discussion was based largely on the results of a survey of company practices, reported through a questionaire prepared in its initial form by the project chairman, S. L. Koslow, of the
Long Lighting Co. The compani
were queried about various ways
employing such indicators as: tur
over ratios, issues of materials a
supplies, investments in M & S, e
pense per M & S issues, percent
inventory adjustments to total M
S inventory, receipts, etc. The d
cussions produced varied reactio
even among the majority whi
tended to pessimism concerning t
possibilities for measuring perfor
ance. Examples: Discussion Lead
C. V. Myers of the Philadelph
Elect. Co. urged his colleagues
make more progress with intern
measurement before undertaki
intra-company comparisons. B
Atlantic City Electric's B.
Walshe maintained that "stores pe
formance is improving whether
is measured or not."

Attempt Purchasing Measurement, T

In an effort to find yardstic
with which to measure purchasi
performance, F. M. Reinhold of t
Connecticut L. & P. Co. survey
the practices of 37 utility compani
operating in 48 of our 50 state
The tabulation indicates that si
of company or number of custome
has considerable bearing on the a
parent efficiency of the purchasi
organization, and that there seem
to be "an ideal size of utility co

Workshop sessi
of the EEI comm
tee on "Store P
formance Measu
ment" was co
ducted under t
leadership of the
stores specialists
the electric utili
industry: (l. to
seated) Messrs. J.
Blank, M. E. Poor
C. V. Myers, J.
Blumer, C. L. M
Camey, O.
Aydelotte, J.
Logue and J.
Keating. Standin
are the sessio
chairmen, E.
Martin and S.
Koslow.

any" so far as number of employes
er customer is concerned. In the
ustomer range, 250,000 to 450,000
hings happen which make for im-
ortant changes in required person-
el not available in the range, 40,000
250,000 customers, Mr. Reinhold
eported. Some of this gain in effi-
ency become lost in the companies
aving 450,000 to 1,000,000 cus-
omers but then it seems to come
ack very markedly in companies
aving more than 1,000,000 cus-
omers.

Mr. Reinhold also reported that
urchasing performance as meas-
red by the number of orders writ-
n per year per purchasing depart-
ent employe in the "ideal size"
ility company (250,000 to 450,000
ustomers) is higher than in smaller
ze companies (by an average of
8) as well as in larger size com-
anies (by an average from 321 to
7).

Noting that there are many vari-
ble which can affect data tabulated
this survey, he acknowledged
at "none of us can do much of
ything" about the size group in
hich our companies fall.

In interpreting the data of his
rvey, Mr. Reinhold concluded:

"It would appear that the most
fective organization would have
sponsibility for all areas of ma-
rial management such as purchas-
g in its various phases, storeroom
erations, traffic, reclamation and
e disposal of scrap and usable
uipment no longer required. The
acing of full responsibility for
ese functions with a single de-
rtment head can make for an
tegrated department which should
sult in some important economies
d be more effective in its contri-
tion to the company it serves.
nd, the training of our organiza-
ns probably has more to do with
effectiveness than anything else."

The use of "open-end" or blanket
rchase orders was studied by a
oject group headed by D. E. Nes-
of the Duquesne Light Com-
ny, and included Messrs. H. M.
rrett, W. Y. Cottom, D. J. Fitz-
rald, H. M. Stockton, R. D.
alker and E. J. Wilson.

Blanket Orders: Advantages . . . and Cautions

Mr. Nesbit of the Duquesne Light Co. recorded these advantages for blanket order issuance:

1. Saves time and money by eliminating work through reducing the number of purchase orders which are issued.
2. Speeds delivery of supplies.
3. Price protection and price savings may be realized.
4. Distributors can plan for orderly stocking of materials.
5. Company requirements for a particular commodity may be combined into one order.

These cautions were suggested by the survey data reported in Mr. Nesbit's summary:

1. Blanket orders require a certain amount of policing and are more difficult to control.
2. There is a possibility of reduction in price for the item during the life of the order.
3. Their use may limit sources of supply.
4. There may be a loss of competition.
5. Certain purchasing department perogatives may be bypassed.
6. Possible loss of personal contact between Buyer and Vendor.

More than $1-million a year is spent by each of 22 utilities in the form of as many as 5,300 blanket orders, Mr. Nesbit reported. The value of such purchases compared with the total value of all purchase orders written annually ranges up to more than 37-percent.

Mr. Nesbit reported that "a representative company" would use the following procedures for blanket purchases:

1. Open end orders are predominantly issued in January covering a period of one year and are known as blanket orders.
2. Requests for blanket orders are initiated principally by the Department of the Company requiring the item.
3. The blanket orders are used for selecting stock items, non-stock items, and services.
4. Of the items procured by issuing blanket orders, approximately 85-percent of the *quantities* are "indefinite," 90-percent of the *commodities* are "specific" and 90-percent of the orders are priced.
5. Competitive quotations are normally solicited for the items to be purchased by blanket orders.
6. Releases against these blanket orders are made either in writing or verbally.

**dership for the EEI Purchasing and Stores
nmittee comes from this group: (l. to r.) E. J.
tin, New Orleans, New Orleans P. S., vice-
irman, stores; H. T. Simpson, Boston Edison
chairman; R. B. Gear, vice-chairman, pur-
sing (and chairman-elect); and EEI staff
etary, Al Softy.**

7. The blanket orders may or may not be subject to any dollar limits, but if so subjected the limits appear on such orders.
8. Generally less than 500 blanket orders are issued annually and represent substantially less than 5-percent of the total number of all purchase orders written in a year and less than 10-percent of the total of all purchase orders issued annually.
9. These orders are generally subject to cancellation at any time at the option of the Company.

M. C. Ross of Columbus and Southern Ohio Electric Co., reviewed "Trends in Inventory Procedures." Mechanization in these procedures offers new opportunities, he said, as indicated by the fact that about two-thirds of over 30 utilities responding to a survey have changed to new systems in inventory control in recent months. Of these, only one reported returning again to a system used previously.

"Computer Applications in Purchasing and Stores" were described by Dr. Michael Shegda, of Lybrand, Ross Bros. & Montgomery, N. Y. C. The aim of such applications, he indicated, was primarily to improve the control and accuracy of these service functions, although the application of computer techniques and equipment tends also to reduce costs.

Dr. Shegda listed these procedures where advantages are gained by applying computers in purchasing and stores work:

1. Exception reporting of inventory status
2. Optimum ordering quantities
3. Control of material usage for production orders
4. Automatic preparation of purchase requisitions
5. Control outages through safety stock calculations
6. Vendor follow-up on overdue orders
7. Transaction data
8. Manual posting
9. Machine procedures
10. Arrangement of stock items by dollar usage
11. Analysis of inactive items

A study of "Stores Employe Training Programs" was reported by a project committee led by G. A. Spencer of the Detroit Edison Co. A growing need for such programs, he noted, has developed since more and more specialization and automation have required of employes broader areas of knowledge and supervision and have encouraged companies to adopt a philosophy of "job enlargement" or the building of more skill and responsibility into jobs.

Stores employee training programs were discussed in one session by: (l. to r.) M. A. Edwards G. A. Spencer (speaking), W. S. Marks and C. V. Myers.

M. A. Edwards of Duke Power Co., W. S. Marks of Commonwealth Edison Company, and C. V. Myers of Philadelphia Elect. Co. reported how their companies utilized a variety and (informal to formal) range of training activities designed to get better and safer performance from employes throughout their period of company service.

Mr. Spencer described special stores programs for both on-the-job and off-the-job training in the proper handling of paper work and of equipment and for efficiency improvement through work simplification. These programs at Detroit Edison are conducted by a procedure and methods group, which includes an equipment trainer, a procedures trainer and a work simplification coordinator.

J. F. Estill, Jr. of Houston Lighting & Power Co., reported the results of a survey on the disposal of surplus and obsolete material. Suggesting that many utilities are not recovering "fair value" from such disposal, he promised "real savings" as the reward for greater efforts in this activity. Unused surplus is being returned to vendors as the most effective outlet, Mr. Estill reported, while used surplus and obsolete materials are best disposed of through used equipment dealers.

Mr. Estill suggested greater efforts he made to prevent materia from becoming obsolete and that vendor re-stocking policies should be studied.

The EEI Purchasing and Stores Committee also heard a description of the Philadelphia Elect. Co.'s emergency procedures plan as i affects the purchasing and stores operations. The utility's current plan was expanded last in 1958 after the company used $830,000 worth of materials to repair the damage from a snow storm of unprecedented severity. Vice-President W. H Jones indicated that at no time in the period of restoring service to about 400,000 customers was any activity curtailed for lack of materials.

As in earlier meetings of the EEI committee, a continuing interest in keeping abreast of nuclear power development was demonstrated. This time the committee listened to a report on the Peach Bottom Atomic Power Station, presented by J. Lee Everett, of the Philadelphia Elect. Co.

Special subcommittees reported on standardization activities. A materials standards liaison group, headed by J. F. Estill, Jr., is cooperating with other groups in an attempt to select the three most popular sizes of service-drop cable. Under Wm. M. Holls of the Baltimore Gas & Elect. Co., a standard packaging and nomenclature subcommittee is continuing work on insulator packaging standards and on pole line hardware packaging standards. He indicated that a revision of the latter might be ready for proposal to the industry within the next year.

dividual Must Be "Capacitor" For "Low-Voltage" emocracy, MVEA Engineers Told

Apathy has caused a serious ow-voltage" condition at the reiving end of the line in our deocracy, and something has to be ne about it if we would preserve r priceless gift of freedom, arles Czeschin, president of VEA and also of the Arkansasissouri Power Company, warned me 700 delegate engineers attendg the Missouri Valley Electric ssociation's Thirty-First Engineerg Conference, April 20-22, in Kans City, Mo.

Only the individual can serve as e "larger conductor" and the "cacitor" to correct this situation, he id, for we are parasites contributg to the "low voltage" unless we t back in more than we take out. dividual action can be chatting th the man next to you, or writg to your senator. In the latter innce, tell him what you want done . or that he is doing it right. Make re that your neighbors know the ts about candidates for office. If u believe you cannot accomplish ich as an individual just think w much good a single sound inlator accomplishes . . . then how ich trouble can be caused by a fective one.

Federal government, concluded eschin, is already the largest procer of electric power, the largest ick operator, the largest ship ner, the largest holder of grazing d timber lands, the largest lender d the largest borrower. Support taxes now claim 27 percent of tional product. For those of you o doubt what I say, he advised, e another look at TVA.

Swinging the tenor of the confere into the technical vein, Dr. n A. Hutcheson, vice president charge of engineering, Westingise Electric Corporation, rewed current research and progs in application of direct-converin methods of generating electric wer. Of the four major methods sently under study, he said, the gnetohydrodynamic generator ears to hold the most promise future application to commerl electric power production.

Major problem in all of the meth, said Hutcheson, is finding the right materials for temperatures required. But, he continued, the incentives of lower capital costs, greater efficiency, raised system efficiency make continuing research worthwhile. By saving one mill per kw a decade from now, he predicted, will save $1-billion per year on a national basis. In addition, he concluded, there is no reason why these sources should not fill the gaps in our present techniques; and, thorough research may give rise to new concepts.

Charles Czeschin, left, MVEA president and president of Arkansas-Missouri Power Co., and Dr. John A. Hutcheson, vice president-engineering, Westinghouse Electric Company, present opening addresses at MVEA's 31st engineering conference.

Readers are referred to a more comprehensive report of this research program beginning on page 37 of the May 1, 1960 issue of EL&P.

Prime Movers

Larger size is a major factor in new boiler design, according to J. I. Argersinger, Combustion Engineering, Inc., because more eggs are in one basket and a very high degree of reliability is required. Automatic controls are a necessity with larger units, he said, but improved efficiency and reliability are justification for their use. Integration of controls and instruments and coordination of operating procedures are receiving new attention that will result in improved design, operating techniques and instrumentation, he predicted. Flame monitoring and explosion prevention are receiving intensive study to ascertain best procedures for push-button plants. Excessive cost of steam piping in the larger units is being reduced by locating the superheater outlet as close as possible to the turbine throttle. Design of the top fired boiler permits further economy in supporting steel required, he said.

Two methods of providing peaking capacity via short time overload with minimum departure from conventional design were described by Argersinger: 1. Lower steam temperature and raise operating pressure making it possible to pass more steam through the turbine; 2. Generate extra steam in the boiler and bypass it around the high pressure turbine to the reheater.

C. J. Woodley, Kansas Gas & Electric Company, reported several years successful experience with dual-circulation boilers which use water having less costly treatment yet produce high purity steam, resulting in minimum silica deposit on turbine blades.

E. H. Miller, General Electric Company, enumerated immediately-applicable developments in the steam turbine-generator field which promise improved reliability, efficiency, and ease of maintenance. These included advancements in nozzle and bucket sections, more effective generator insulation, true centerline supporting of shells, and "stop valve bypass" starting system. Progress is being made, he said, that will assure economic availability of turbine-generator ratings, steam conditions and cycles that will be needed in ten years.

A comprehensive study by F. W. Brunson, Union Electric Company, discussed problems encountered in designing the high-pressure, high-temperature piping for his company's 300-mw Meramec unit No. 4.

Start-up experience, problems, and corrective measures with OG&E's new 200-mw No. 4 unit at the company's Mustang plant were related by W. C. Doty. Complete installation was accomplished by the company's construction department. During assembly and tests, said Doty, nothing was assumed to be in working order until it had been thoroughly checked out and proved to be satisfactorily operable. The unit is said to be the most efficient now in operation in the United States.

Power Systems

Discussing economic considerations in applying pumped storage hydro generation to a power system, G. S. Whitlow, Union Electric Company, said that such a peaking plant must compete in price with all other types of available peaking capacity as well as with conventional units. It must be built at a low enough price to offset the energy penalty assessed against it and, of course, a suitable site with relatively high head between upper and lower reservoirs must be available. Transmission losses in wheeling both ways, he said, restrict allowable distance of the site from the service area, but increased costs of transmitting over distance can be offset by a site providing a higher head.

Site capability, continued Whitlow, must match expansion needs at the time of installation; an installation too large incurs excess carrying charges until the next scheduled capacity addition can be reduced to adjust for size; if too small, it does not provide sufficient capacity for needs. Large variations from capability dictated by expansion needs can further upset the order of scheduling capacity additions.

Pumped storage must be considered as both a load and a source of power, said Whitlow, thus presenting different transmission requirements than the conventional plant and likely disrupting previously planned transmission expansion pattern. Stability considerations are compounded, as are losses. Despite the many new problems introduced by applying pumped storage, lower capital annual charges, longer service expectancy, and lower depreciation rate make it attractive.

Since a pumped storage plant is essentially a coal-burning hydro plant, Whitlow concluded, it will have an incremental cost, and any future reduction in system fuel costs will reflect in lower pumped storage costs. Such a plant will smooth load requirements on system steam plants, providing a more favorable use factor and contributing to reduction in system generating, fuel, and maintenance costs.

L. L. Linder, Iowa Southern Utilities Company, described how five Iowa companies are pooling generation and transmission facilities with worthwhile benefits to everyone without a central dispatching office. This interesting arrangement will be discussed fully in a future issue of EL&P.

E. H. Preston, Leeds & Northrup, traced rapid development and refinement of economic dispatch computer-controllers and enumerated the several areas of savings which justify application of this equipment.

Overhead Systems

Studies leading to reduction in costs of 69-kv transmission lines were reported by F. M. Jennings, Iowa Southern Utilities Company. These were aimed at getting rid of "gold plating" by taking advantage of the full inherent strength of components to reduce right-of-way needs via single pole wishbone
structures where terrain permit
increase span lengths, obtain diag
onal r/w to shorten overall dis
tances where possible, and emplo
design permitting reduction in in
sulation levels.

Significant reduction in overa
costs of tree trimming operation
was reported by Jess Reed, Th
Empire District Electric Compan
through mechanization with chai
saws, chippers, and aerial lift
Greater production with fewer me
has resulted, he said, and crew
have a greatly improved attitud
toward their work.

In his discussion of fuse-breake
coordination on future 15-kv ci
cuits, G. E. Hertig, I-T-E Circu
Breaker Company, concluded th
equipment must have characteri
tics not now available to meet ci
cuit conditions. Faster breaker
higher interrupting capacity for r
closers, selective ranges of res
timers for reclosers and relays, an
a greater selective range for ope
intervals of reclosing devices wi
be necessary, he said.

Underground

H. G. Hally, Iowa Power an
Light Company, reported expe
ence of his company in developi
and installing a special pad-moun
ed utilization transformer for app
cation in residential undergrou
service. Loss of diversity and i
creased capitalization, he said, a
more than offset by savings in se
ondary losses and wiring costs, pl
vastly improved voltage regulatio

Very worthwhile savings in tot
investment for developing Okl
homa Gas and Electric Compan
underground system over the ne
15 years can be realized by insta
ing capacitors on the 120/208-v
side of sides of transformers or
the ends of services, according
studies reported by D. D. Canad
Savings indicated, he said, favor t
latter location. Additional benef
from the capacitor installations a
anticipated in the form of volta
improvement, improved servi
and possible deferrals of prima
extensions and transformer chang
outs.

P. C. Jacobs, Jr., The Chas
Shawmut Company, reported d
velopment and successful field te
ing of low loss fuses which perm
150 percent contingency loading

Ralph Thornton, left, OG&E, and W. K. McMurray, St. Joseph Light & Power Company, are vice chairman and chairman, respectively, of the MVEA engineering conference.

nodified network protectors.

Discussing late developments in luminum-sheathed power cable, . J. Merrell, Phelps-Dodge Copper 'roducts Corporation, presented vidence supporting the conclusion nat tubular aluminum-sheathed ower cables may be trained to the ame radii and offsets considered atisfactory for their lead-sheathed ounterparts; that manhole bend fe may be expected to be at least quivalent to that of lead sheath roviding joints are of proper deign to avoid or protect against conentration of stresses: that bend life vith an efficient mechanical joint s many fold that of wiped or velded types; and that wipes must e sealed against moisture.

Electrical Apparatus

S. H. Pollock, Kansas City Power z Light Company, discussed appliation and control of kilovars to naintain high power factor loads n generators, transmission lines, nd distribution circuits. His paper vill be presented in a future issue f EL&P.

Influence of foundation costs on ubstation design was discussed by). F. Weber, Iowa Power and Light 'ompany, who concluded that a nore expensive structure can often e justified if added cost is offset y saving in foundation cost. Where oil conditions are good and loadngs light, he said, heavy structure bracing or high rigidity may be wasteful.

R. B. Shores, General Electric Company, described a new line of air-blast breakers of modular design for service from 115 kv through 345 kv. Among advantages he noted were: less outage time of primary circuits for maintenance or inspection; elimination of ground shock and reduced weight, contributing to reduced foundation costs; elimination of oil fire hazard; short arc duration; direct visibility of contacts when tank covers are open; interchangeability of parts; repetitive manufacture of high-volume modular units; and flexibility of increasing interrupting rating and changeover to higher voltage.

W. B. Wynes, Jr., Iowa-Illinois Gas and Electric Company, discussed considerations in applying and coordinating overcurrent protective devices on distribution circuits, stressing factors overlooked or not fully considered in the light of greater load densities, increasing transformer ratings, changing consumer loads, realiability expected.

Discussing his company's automatized transmission system, G. E. Brooks, Oklahoma Gas and Electric Company, concluded that only through use of automatized schemes can tapped transmission lines effectively perform their dual functions . . . bulk power by consignment and local delivery at the tap. Efficient operation of a complex system, he said, requires pre-approved procedures and instructions, especially if service restoration is involved.

Problems developing from adding community television antenna, in the form of coaxial cable, to joint-use power and telephone poles were discussed by F. E. Courte, Southwestern Bell Telephone Company. He recommended a standard packaged contract plan that would insure proper clearances, protect people, plant and services, and simplify administration.

J. E. Filip, Iowa Electric Light and Power Company, related problems encountered in Cedar Rapids as a result of joint occupancy of company poles by the city fire alarm system. Cooperation of participants, he said, is the key to continuing harmony. As citizens we are interested in efficient, economical operation of the fire department and its alarm system. We are interested in insuring our safety and that of our customers and, incidentally, in keeping fire insurance premiums low. We consider the fire alarm system as important as our own distribution system, he said, and any requests of the fire department are handled as though the problems involved were those of the company. Because of singularity of purpose and harmony that prevails, he concluded, the potential ogre is an elf whose company we enjoy.

---

ink Space Travel And Power t Indiana Young Men's Parley

Magnetohydrodynamics—a possile path to power from plasma—rovided a tie between power production and astro physics for some 00 junior executives attending the 0th annual Young Men's Utility onference. John A. Tillinghast, aff engineer, American Electric ower Service Corp., related powr to the cosmos through his exlanations of how MHD was used fusion studies and in space veicle re-entry problems. "A protope MHD electric power generator nould be available in less than ten ears, if the present rate of progess continues," he predicted.

The two-day conference, sponored by Indiana Electric Associaon, was held in Ft. Wayne, April 21-22. YMUC is unique in that it brings together utility men of the Indiana power companies under age 35, on common ground. It ". . . represents the ideal medium for an exchange of ideas and ideals on the part of the soon-to-be leaders of the private electric utility industry," said R. E. Doyle, Jr., vice-president and general manager, Indiana & Michigan Electric Co., and vice-president of Indiana Electric Association.

"Primary purpose of YMUC is to stimulate and direct our thinking toward the future so that all of us will be in a position to shoulder greater responsibility," said Donald Blue, production methods supervisor, Indianapolis Power & Light, and one of six group-discussion power production leaders.

R. E. Doyle, Jr., vice-president and general manager, Indiana & Michigan Electric Co. (right) charged the group with tomorrow's responsibility. John A. Tillinghast, staff engineer, American Electric Power Service Corp. brought astro physics and power production together through MHD. (Q. F. Stultz Photo.)

Quentin F. Stultz, II, editorial assistant, Indiana & Michigan Electric Co., who directed publicity for

At head table are (l-r) James E. Deal, Indianapolis Power & Light; Richard Millon, Indiana Bell Telephone; Jack E. Riel, Northern Indiana Public Service; James M. Rose, Southern Indiana Gas & Electric; and Gene Johnson, Public Service Co. of Indiana.

At rostrum, Judson Seelye, Mooresville Public Service Co., presides at a luncheon session. From left are Rev. Gerald H. Jones, Wayne St. Methodist Church; Jack F. Stark, Indiana & Michigan Electric Co.; R. E. Doyle, Jr., vice-president and general manager, Indiana & Michigan Electric Co. and vice-president Indiana Electric Association; John H. Chiles, Jr., vice-president transformer division, Westinghouse Electric Corp.; and A. C. Crandall, secretary, Indiana Electric Association.

Donald Blue, production methods supervisor, Indianapolis Power & Light (right of projector) leads the power production discussion.

Walter A. Schulz (far right) chief engineer, Public Service Co. of Indiana, conducted the transmission group discussion.

Distribution group is led by J. H. Hilton, superintendent of engineering, Southern Indiana Gas & Electric (head of table).

the conference, said that high interest in the conference was expressed by statewide media.

Five other group discussion sessions covered transmission, sales personnel relations, distributio and accounting. These were led respectively by Walter A. Schulz chief electrical engineer, Publi Service Co. of Indiana; James E Hughes, system sales representative, Indiana & Michigan Electric M. J. McCullough, assistant manager of industrial relations, Northern Indiana Public Service; J. H Hilton, superintendent of engineering, Southern Indiana Gas & Electric; and Howard Tucker, auditor Public Service Co. of Indiana.

Importance and magnitude of th farm load was threshed out b W. J. Ridout, Jr., general manager *Electricity on the Farm.* He showe that the kwh marked for farms fo the next five years exceeds $3½ billion. Research is pointing th way to a revolution in agriculture and "electrical energy will by necessity be depended upon to powe the equipment," he said. On top o all of this, agricultural assets an income are more than adequate t pay for mechanization, he said.

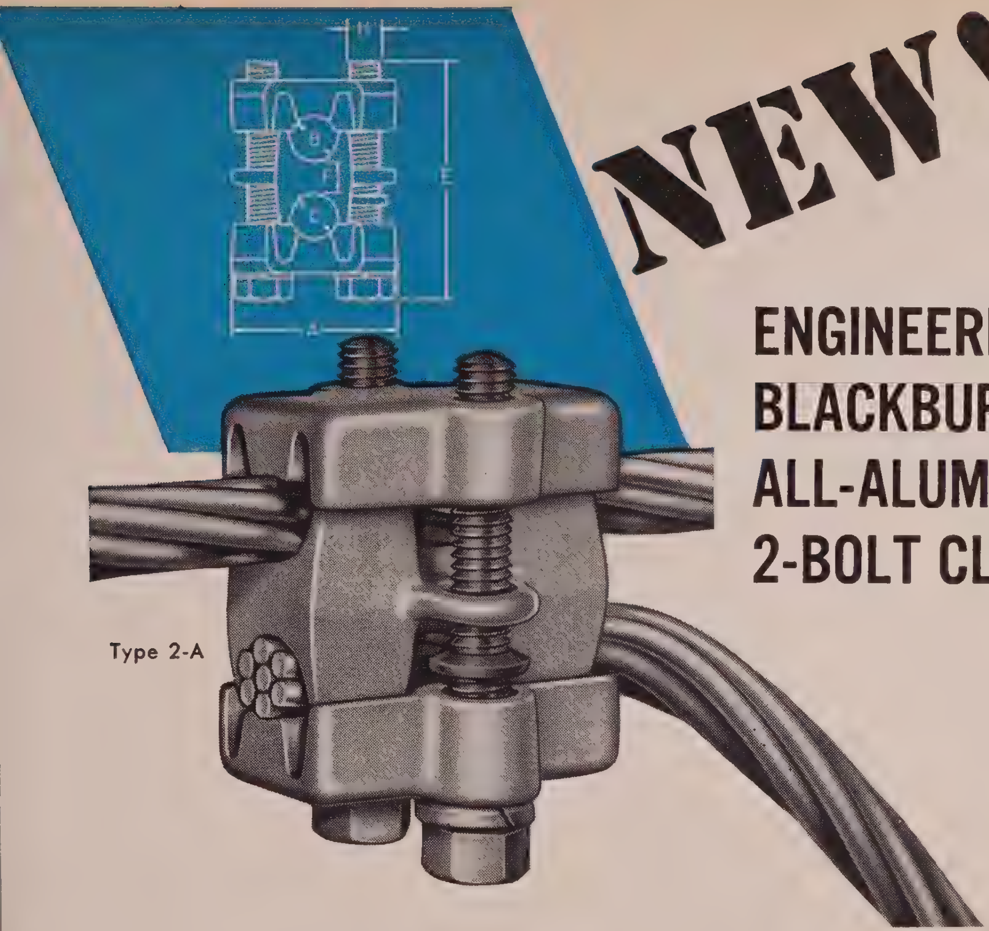
While money is available to pa for new, electricity-consuming devices, now, dangerous economi years lurk ahead for utility financing because of inflation, said Dr B. J. Rogge, dean, Wabash College

Inflation, and its not-too-silen partner—more taxes—tied to huma relations between commodity, company, labor and management b John H. Chiles, Jr., vice-president transformer div., Westinghous Electric Corp.

"All the people who are not kicking about taxes should be," he said "Ninety-three percent of taxes com from people making under $10,00 per year." To illustrate how effective is the tax bite, he said if th billion-dollar wage-benefit packag had not been given to his company's working force, the industr would have been ahead. Why "Fifty-two percent of it is in taxes," he said.

Are We Dope Addicts?

Just as a narcotics addict get "hooked" because he chooses a artificial stimulant to keep hi from facing reality, so are today'



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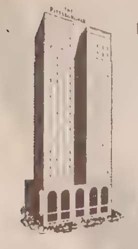

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American people falling victim to artificial stimuli in Washington, said Don A. Tabbert, United States District Attorney, Indianapolis.

With three trends, he gave dire warning of the country's present state: (1) Creation and maintenance of government is increasing the amount of federal bureaucracy—with no trend to reverse. (2) People are becoming completely dependent upon large federal government — forgetting that the Government was formed on the basis of local governments. (3) We are undergoing a national addiction with people becoming lethargic toward participation in the affairs of government. People tend to think their individual participation won't have any effect on government.

A Highway Mania Cure

A good remedy for "highway mania" was presented by Ralph J. Young, safety engineer, Public Service Co. of Indiana. "For no accidents use the Smith System," he said.

Summed up, the Smith System teaches, (1) Aim high in steering. (2) Get the big picture. (3) Kee your eyes moving. (4) Make sur they see you. (5) Leave yourself a out.

Better Use . . .

(Continued from page 65)

desirable to underbuild an approach to the Mississippi Rive Bridge near New Orleans. Th Bridge Authorities required tha their maintenance personnel b protected from the conductors b some means. This structure carrie a canopy of mesh wire over its to and partially down each side. Thi was acceptable to the Bridge Authorities as offering adequate pro tection for their crews. To hav gone around and over the approac would have added about 2½ mile to the length of this line. By constructing this special type tower right-of-way was made availabl whereby otherwise it was not to b had.

Lake Crossing

A portion of our 230-kv transmission line is erected in Lake Pontchartrain. When plans were made t construct this line, two possibl routes existed. One was across th lake. The other was adjacent to th lake. Choosing the route adjacent t the lake would have meant crossin 35 miles of undrained timber swam land. Those who have had experience constructing lines throug swamps know what a costly job i can be. Clearing the right-of-wa initially is a big job, and one is stil left with the problem of reclearing Obtaining easements throug swamp lands is not easy.

Ample right-of-way space i available in the lake with only the permissions of the Coast Guard and U. S. Engineers required.

This does not demonstrate more intensive use of right-of-way space, but it does show how available right-of-way space of this nature can be utilized to good advantage.

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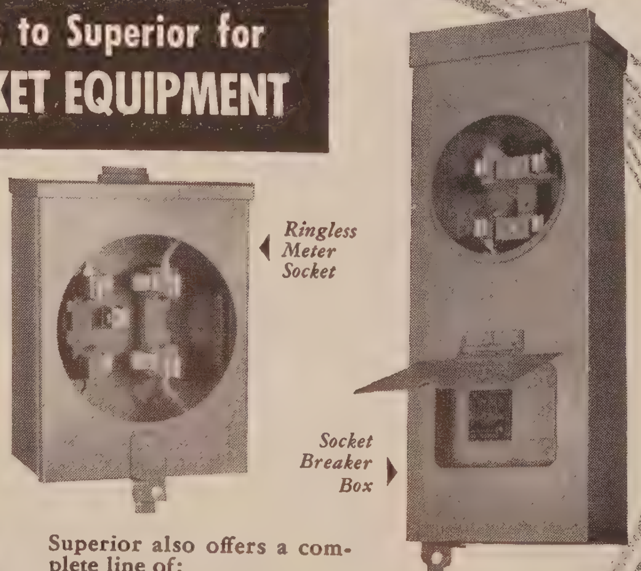

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ame $, Same Space, More KVA

Manufacturers Boost Transformer Ratings

Improved insulation, materials nd thermal characteristics are giv- ıg the utility industry increased ransformer loadability without sac- fice of transformer life. Now ransformers can operate at 65C mperature rise instead of 55C. ere is what manufacturers are oing:

Westinghouse Electric Corpora- on's Super Insuldur system has lowed the name plates of all self- ooled transformers to include a pplemental rating 12 percent eater than the 55C rating. Triple- ted and forced-oil-cooled trans- rmers will have a supplemental C-degree rating ten percent ove the maximum 55C rating. In ldition, new distribution trans- rmers (High-Load 65) rated at 25-kva, 2.4 and 7.2 kv, respectively, that operate at 65C, are now offered.

General Electric Company's Permalex insulation makes its new ratings possible, and is now available on all oil-immersed distribution transformers, network transformers and medium transformers. The new nameplate ratings carry the 12-percent higher base kva with same life expectancy as the older units at no additional cost. G.E.'s "55C/65C" ratings apply to distribution transformers with ASA capacities through 500 kva, and to network transformers with ratings through 2500 kva. A 5000-kva 55C transformer now can operate at 65C rise 5600 kva with same life expectancy.

Line Material Industries increased its ratings with normal life expectancy without design change for all Issue E Round-Wound distribution transformers rated through 75 kva, 2.4 through 8 kv, because of excellent thermal characteristics. Ratings of 5, 10, 15, and 25 kva have been bumped 20 percent to 6, 12, 18, and 30 kva respectively. Ratings of 37½, 50, and 75 kva go 12 percent to 42, 56, and 84 kva respectively. Transformers of this type operating at these higher rated loads will not exceed the present ASA hot-spot temperature rise limit of 65C. Thus present users of Issue E can automatically uprate their units with assurance of normal life expectancy, according to L-M.

Summed up: Utilities are being offered reduced transformer investment cost; greater loadability; or longer transformer life, or any combination of the two, and elimination of different loading criteria for various transformers.

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opper Outlook uestionable

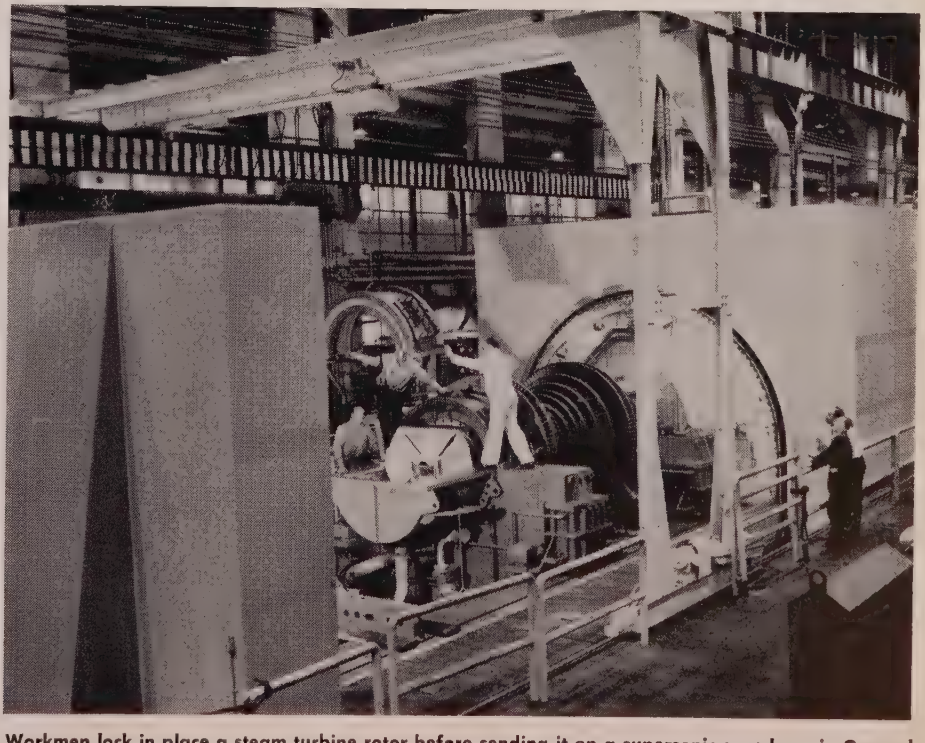
Considering the inbalance be- een the world's supply of copper d demand, the domestic price of cents a pound has been living on rrowed time," Dr. Joseph Zim- erman, metals industry authority d wire and cable company execu- es recently.

According to Dr. Zimmerman, ly foreign buying of American pper, prompted by possibilities of ossible strike of copper workers Chile, Rhodesia or the Belgian ngo, has maintained a relative ance in supply and demand on domestic market and has sus- ned the price.

Had it not been for the recent ge exportation from the United tes, the price here would have n lower now," he stated.

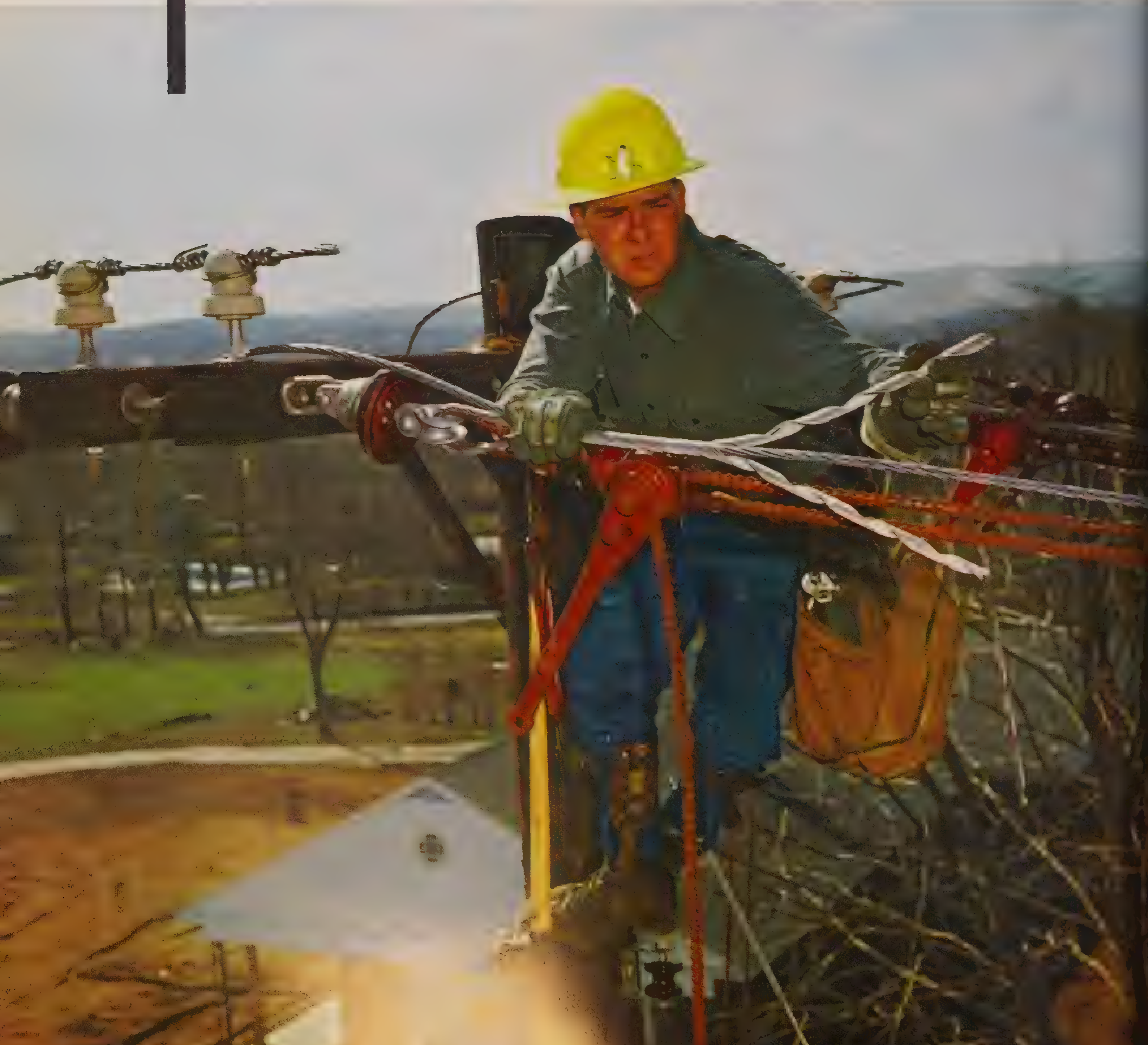
Dr. Zimmerman forecast an ex-

(Continued on page 78)



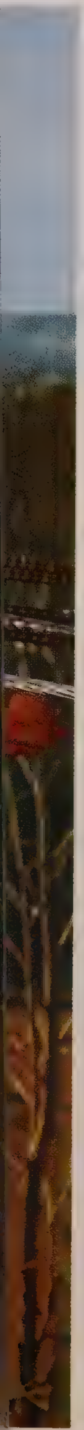
Workmen lock in place a steam turbine rotor before sending it on a supersonic speed run in General Electric's Schenectady balance and overspeed test facility. Function of the facility is to permit fine balancing of turbine rotors under simulated operating conditions.

THE FASTEST, SIMPLEST, SAFEST WAY TO DEAD-END DISTRIBUTION CONDUCTORS



Philadelphia Electric Company lineman dead-ends 4/0 ACSR conductor with PREFORMED Aluminum Dead-End. The dow guy is of ⅜ galvanized steel strand with GUY-GRIP dead-end

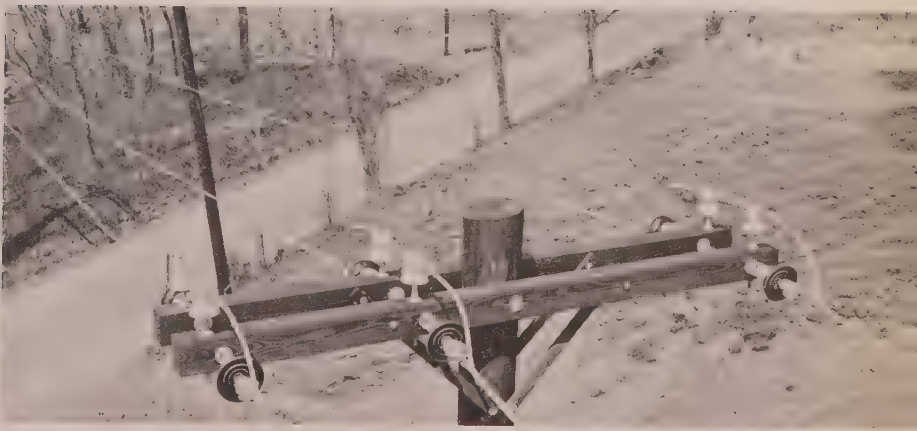
Patented—U. S. Patent No. 2,761,273.



With *Preformed* TRADEMARK CABLED LOOP DEAD-ENDS

which OFFER YOUR COMPANY

1. The most economical Dead-End available
2. UNIFORMITY OF ALL APPLICATIONS
3. Elimination of high stress concentrations
4. Extra holding strength to withstand ice loading and ice dropping
5. Faster, safer application . . . with ONE-PIECE Preformed DEAD-END



WIDE AREA SUPPORT with continuous line carry

Write for Booklet-of-the Month "Another New Twist"

PREFORMED LINE PRODUCTS COMPANY

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is a trademark which is registered in the U. S. Patent Office and is the property of Preformed Line Products Company.

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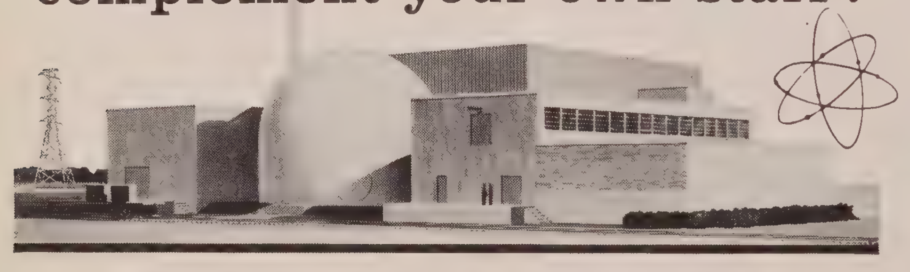
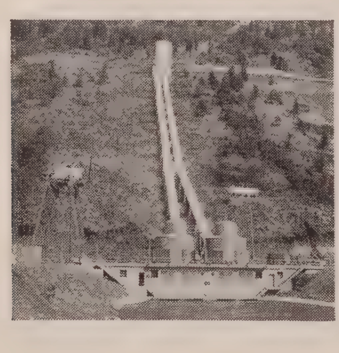
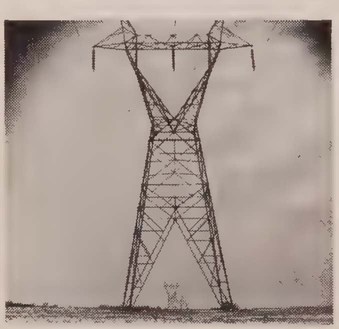
Which Pioneer service do you need to complement your own staff?







DESIGN AND CONSULTING ENGINEERING SERVICES

Pioneer specializes in designing power plants and offers design service for fossil fuel, hydro and atomic plants. It will also assist in forecasting load growth, in site selection, in purchasing and expediting of equipment and construction management. Pioneer's other services include substation, transmission and distribution studies and design.

SERVICES IN REGULATORY MATTERS

Pioneer offers its services in all phases of Federal, State and local utility regulation, including natural gas and electric rate matters, certificate proceedings, licensed project accounting requirements, depreciation studies for rate case and income tax purposes, cost allocations and special studies.

CORPORATE SERVICES

Pioneer offers its services as business and management consultants; stock transfer and dividend disbursing agents; financial, accounting and tax consultants.

Write for Booklet "PIONEERING NEW HORIZONS IN POWER"

Serving Electric Utilities and
Industrial Power Users Since 1902

Pioneer Service & Engineering Co.
231 SOUTH LA SALLE STREET • CHICAGO 4, ILLINOIS

GAO Cites Need For Bid Form Revision

The General Accounting Office has announced that the "Buy-American Data" requirement will have to be changed to cover cases where suppliers plan to use both domestic and foreign materials.

The announcement was evidently triggered by a recent bid situation occurring out of the purchase of eight hydraulic turbines for the Glen Canyon Dam.

Low bidder on the project was English Electric Co., using all foreign materials. Baldwin-Lima-Hamilton, who came in second, proposed a foreign-domestic mix.

Reclamation Form 7-1840, used to supply data, says that "the cost of all products, both foreign and domestic, used in the articles, materials, and supplies to be furnished," is to be figured by making certain deductions from the total bid price. Among deductions are "fabrication or processing costs, if any, of either foreign or domestic products in bidder's United States plant or at other point of fabrication or processing in the United States."

To get preference as a U. S. firm costs of American-made components must exceed those of foreign-made items.

B-L-H contemplated shipping foreign components of turbines directly to the dam site from Europe. Installation was to be made under a separate contract.

As the GAO sees it, in this situation, "the exclusion of domestic processing costs of domestic components and the inclusion of foreign processing costs of foreign components will not determine the correc proportionate costs of the respective components of the turbines to b assembled therefrom." Further elimination of domestic processing costs of domestic components woul violate the intent of the Act, con cluded the Agency.

COPPER OUTLOOK . . .

(Continued from page 75)

cess of supply on the domestic mar ket this year, barring strike or worl stoppages. This could mean a reduc tion in the price of copper wire an cable, as long as the metal is no stockpiled or production controlle

MEN OF POWER

59 Lamme Medal to Kilgore of Westinghouse

The 1959 Lamme Medal of the American Institute of Electrical Engineers has been awarded to Lee A. Kilgore, manager of engineering at Westinghouse Electric Corp.'s East Pittsburgh division. The medal will e presented to Mr. Kilgore at the pening session of the five-day Summer General Meeting of the nstitute in Atlantic City, June 20.

The award was made for Mr. Kilgore's "meritorious achievements in he design of electrical machinery; more specifically, for analyses of synchronous machine reactances; for invention of special armature windings; and for inventions and designs related to large adjustable speed alternating current motors."

Mr. Kilgore is the 32nd recipient of the award.

Named manager of engineering for the East Pittsburgh division in 1954, Mr. Kilgore first joined Westinghouse in 1927. He designed the 165-mw four-pole generator for the Philadelphia Electric Co. in 1934. The unit held the largest rating for 18 years. He is also the inventor and designer of a number of other products and is the author of numerous articles.

---

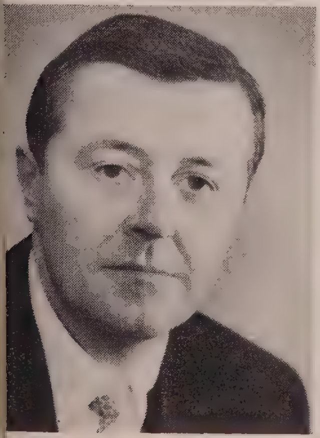
ong Island Lighting Ups Tuohy, Eggerstedt

John J. Tuohy, president of the ong Island Lighting Co. has been amed chief executive officer by the board of directors. Errol W. Doebler, who was chief executive officer until this change, continues as chairman of the board.

At the same time, Fred C. Eggerstedt, Jr., former assistant vice president in charge of finance, was elected vice president of the utility.

Mr. Tuohy joined LILCO in 1945 as an attorney. He was promoted to assistant to the president in 1950 and elected a vice president (sales, promotion, publicity, and employee relations) in 1954. He was elected president and a director of the company in 1957.

Mr. Eggerstedt went to work for LILCO in 1950. He was named assistant treasurer in 1951 and assistant vice president in 1955.



John J. Tuohy (l.), chief executive officer.

Fred C. Eggerstedt, Jr. (r.), vice president.

---

lect Abbott at NEGEA

The election of Charles T. Abbott vice president - operations, of the ew England Gas and Electric As-ciation Service Corp. has been an-unced by Hall M. Henry, presi-nt.

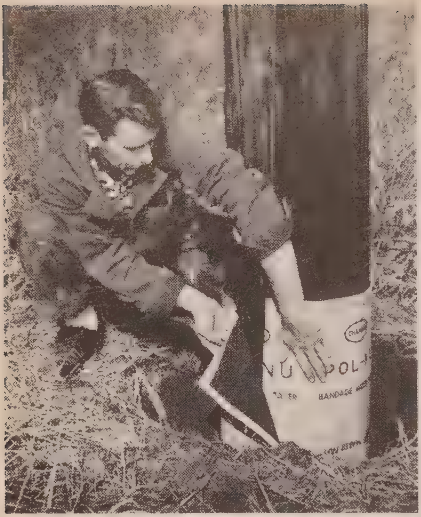
Mr. Abbott, who joined the sys-n in 1930, was appointed electri-l engineer in 1940 and chief elec-cal engineer in 1956. He has been a director of the corporation since 1958. He is a 1930 graduate of Massachusetts Institute of Technology.

Forman Elected VP

H. P. Forman has been elected vice president—public relations of Puget Sound Power & Light Co. He was formerly public relations director of the company.

Mr. Forman joined Puget Sound P&L as assistant to the president in 1955. He formerly was information manager for the New York Telephone Co. A graduate of Harvard in 1934, he worked as a newspaper reporter before moving into the advertising and sales promotion field with the Crowell Publishing Co.

He was named public relations director last year.



Prevent pole failure

with CHAPMAN®

POL-NU

This patented formulation of Pentachlorophenol was developed for groundline treatment of standing poles and has these three superior characteristics:

- Grease consistency . . . adheres readily to standing poles; stable to temperature and storage allowing precision machine application.
- Deep penetration . . . assured through use of an oil selected from over 200 tested; oil meets American Wood Preservers' Association specifications.
- Long life . . . through use of Pentachlorophenol preservative of proven stability; Pol-Nu is not water soluble, won't leach out of treated poles.

POL-NU BANDAGE-MAKER, designed for use with Pol-Nu, cuts costs and speeds application of ground-line treatment to standing poles.

POL-NU PAK is factory-sealed, ready-to-use pole bandage. May be applied instantly by maintenance crews. Easy to stock and handle.

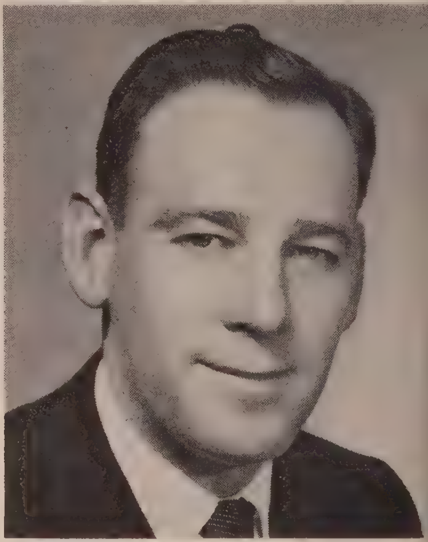
CHAPMAN CHEMICAL COMPANY
Leading manufacturer of wood preservatives
MEMPHIS 1, TENNESSEE
Palo Alto, Cal. • Portland, Ore.
Minneapolis • Charlotte, N. C.

MAIL COUPON FOR COMPLETE DATA
Chapman Chemical Company
P. O. Box 138, Memphis 1, Tenn.
Please send your folder, "Preventive Maintenance For Poles," to:
Name____________________
Company____________________
Address____________________
____

Stone & Webster, Inc. Appoints Two

Stone & Webster, Inc. has announced the election of Raymond C. Foster and Robert H. Willis as vice presidents of the firm.

Foster



Willis

Both have been assistant vice presidents since May 1959, at which time they were transferred from subsidiaries, Mr. Foster moving from Stone & Webster Engineering Corporation where he was engaged in engineering sales work, and Mr. Willis from Stone & Webster Service Corporation where he was Assistant to the President.

Mr. Foster joined Stone & Webster Engineering Corporation in 1946 as an engineer in the Chemical Division of the company's Boston office. He moved to the Engineering Corporation headquarters in New York in 1954.

Mr. Willis came to Stone & Webster Service Corporation in 1949 as a gas consultant, having previously served as an engineer for Ohio Gas Company and as Plant Engineer for Fall River Gas Company. In 1953 he moved to Ashtabula, Ohio, as Vice President and General Manager and a director of Lake Shore Gas Company and of Lake Shore Pipeline Company. In 1957 he returned to the Service Corporation's New York office as a financial consultant and in 1958 became Assistant to the President.

Switzer IP&L V.P.

George F. Switzer was elected vice-president in charge of engi neering and construction of Indi anapolis Power & Light Company at a recent meeting of the directors

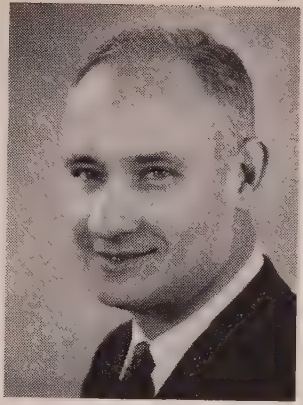
In this position he succeeds Dar C. Hess, a vice-president of the company for the last 21 years.

Mr. Switzer joined the company in 1932 following his graduatio from Purdue University with a electrical engineering degree. Ad vancing through various super visory positions, he was made chie engineer in 1950 and assistant t the vice-president in 1957. He wa elected assistant vice-president i 1958.

P.S. of Indiana Elects Three V.P.'s

Barker

Christianson


Rink

The board of directors of Public Service Company of Indiana, Inc., has elected H. A. Barker, Financial Vice President; H. B. Christianson, Jr., Vice President (Northern Division Operations); and R. W. Rink, Vice President (Western Division Operations).

Mr. Barker, a certified public accountant, has been assistant to Executive Vice President D. P. Pardee. Prior to joining the Company, he was a principal with the public ccounting firm of Haskins & Sells.

Mr. Christianson will be in charge of operations in the Company's Northern Division, succeeding Mr. L. J. Evans, Northern Division Manager since 1944. Mr. Evans has ssumed new duties as Management Representative in public elations and related special assignments, and will report to the Comany's General Headquarters in lainfield.

Prior to joining the Public Serv-e Company, Mr. Christianson was assistant to the Vice President, Operations, for the Chicago, Rock Island and Pacific Railroad with headquarters in Chicago, Illinois. He is a graduate of the University of Illinois and holds a Masters degree in industrial management from Massachusetts Institute of Technology. He is a registered professional engineer and has served in various engineering and operating capacities since 1946.

Mr. Rink is to be in charge of operations in the Company's Western Division with headquarters at Terre Haute. Under the retirement plan of the Company, Mr. Wm. M. Large, the Company's Western Division Manager since 1953, will retire on December 1.

Mr. Rink has had twenty years experience in the field of management and has served in various managerial capacities in Colorado and California. For three years prior to joining Public Service Company he was City Manager at Toledo, Ohio.

Men Of Power Briefs

TILITIES

The board of the Potomac Edison o. has elected **Martin J. Urner** assistant vice president and an officer the company. He has been with e company for 35 years. Other E appointments include: **O. Lee allis**, manager of substation and mmunications department, and **harles C. Wolf**, manager of the ansmission and distribution de-rtment.

Recently elected assistant secre-ry and assistant treasurer of the Pennsylvania Power Co. was **William Robinson.** He succeeds **Lyle C. Hughes,** who has retired after 21 years in the position.

MANUFACTURERS

Westinghouse Electric Company has appointed five sales engineers for their electric heating products. Those receiving new assignments are: **H. J. Rudisaile** with headquarters in Chicago; **Edward A. Zagula** with headquarters in Pittsburgh; **E. W. L. Seager,** Staunton, Virginia; **Arthur F. Holland** with headquarters in St. Louis and **Foster Massey** with headquarters in Atlanta, Georgia.

*Trademark

Fine Fanner Superformed Products

"Superformed* spells S-A-F-E-T-Y to a SAFETY SUPERVISOR"

"We Safety Men must look at any piece of equipment from the *safety* angle.

"Fanner Superforms? Sure, they are safer for our linemen to handle. Not unwieldy . . . no tools required for dead-line application . . . easily controlled with hot-line tools . . . ends are carefully machined to prevent rubber-glove puncturing . . . safer than straight wires and aluminum ribbon."

Everywhere, Safety Engineers, *the men who guard the safety of people,* have a good word for Superforms.

A-1583A

FANNER Superformed* with a "PROTECTIVE TWIST"

ARMOR RODS . . . Protect long-span T&D lines at supports

LINEGUARDS . . . Protect short-span T&D lines at supports

PATCH RODS . . . Repair damaged conductors

TAP ARMOR . . . Protects conductor at tapping points

FANNGRIPS . . . For dead-ending strands and conductors

FANNSPLICES . . . Join two ends of conductor wire

PLASTIC PRODUCTS . . . For conductor surface protection

FANNER
The Fanner Manufacturing Co.
Brookside Park—Cleveland 9, Ohio
Division of Textron, Inc.

Snapit-On

Protector
Shields
for
CONDENSER
AND
BOILER
TUBES

DETERS
EROSION

PREVENTS
MATERIAL
WASTAGE

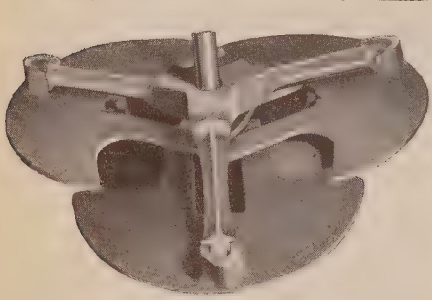
REDUCES
MAINTENANCE

GIVES TUBES
LONGER LIFE

MADE IN STAINLESS STEEL
AVAILABLE IN ALL SIZES

THE Vince BASNIK COMPANY
• 2020 CENTER STREET • CLEVELAND 13, OHIO

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life



EVERSTICK
ANCHORS

For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

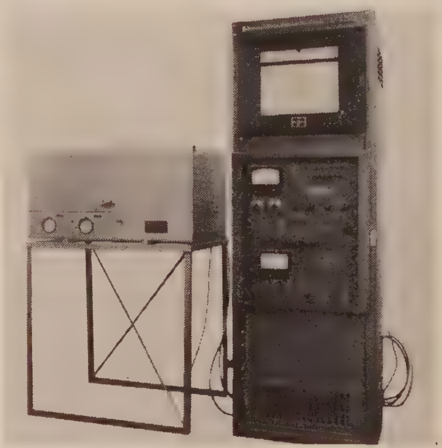
EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

NEW PRODUCT DESIGN

Voltage Regulator

A self-contained automatic voltage regulator called UNOREG, for use on the low voltage side of over 400 standard distribution transformers, has been developed by Westinghouse Electric Corp. Rated at 1¼ kva, the new device will handle distribution transformer sizes to 25 kva. The unit is compact and lightweight, and provides plus and minus five percent regulation of the 120/240-v secondary. Company studies showed that greatest economies resulted only if individual regulators are used to buck a raised voltage at the head of a feeder, instead of attempting to boost undervoltage at the tail end. UNOREG was developed to provide this economical answer for solving complete feeder re-regulation problem as well as to correct for spot an emergency situations. Lab test show unit is capable of operatin for 20 years without failure.

Circle item #26 on reply card



Process Flame Photometer

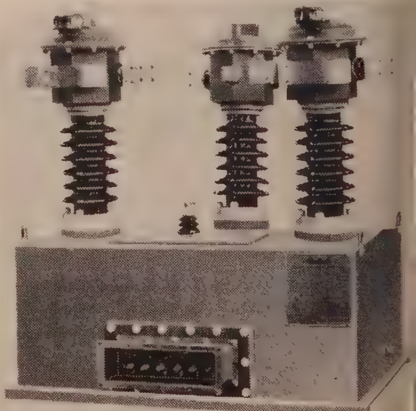
Designed to measure the parts per billion impurities in boiler feed water, a process flame photometer by **Waters Associates** measures chloride ion content by measuring the sodium normally associated with chloride ions. Consists of optical unit and a control panel. When an impurity is present, flame emits characteristic radiation of that material which is rectified and amplified and shown on a meter.

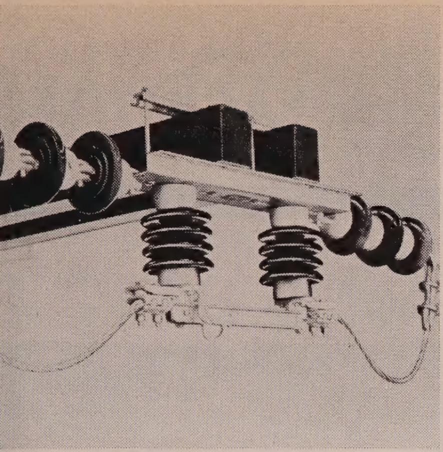
Circle item #27 on reply card

Outdoor Metering Transformer

Standard Transformer Co. ha introduced an outdoor meterin transformer for high accurac measurement and used with watt hour meters for 34.5-kv, three phas circuits. The unit combines curren and potential transformers in on tank, oil immersed. Available fo use on either three or four wir systems. They are made in all ratings through 72-kv, double curren ratios through 800 amps.

Circle item #28 on reply card

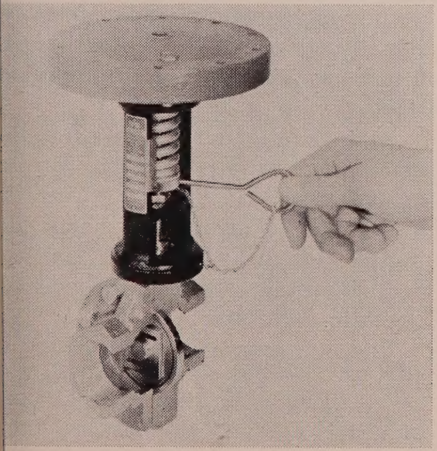




Hook-Operated Switches

Low cost, distribution class hook operated switches for pole-top or structure applications by **I-T-E Circuit Breaker Co.** are available in current ratings of 200, 400, and 600 amps. Switches provide flexibility for a wide range of mountings, insulators and connectors, permit standardization, provide easily visible, positive latching and exceed all NEMA standards for 400- and 600-amp hook operated disconnects.

Circle item #29 on reply card.



mproved Valve Control

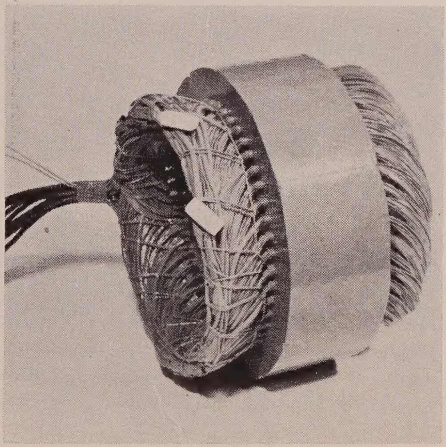
Every **OPW-Jordan** diaphragm ontrol valve and temperature control valve from ¼- to 2-in. size is ow equipped with a loss proof adusting rod. Securely chained to ach sliding gate and plate control alve, rod fits holes around the cirumference of the valve's adjusting wheel. When turned, the adjusting wheel changes the set point by arying the load on the main adusting spring.

Circle item #30 on reply card.

Motor Overload Protection

Positive, simple, fast acting motor overload protection has been announced by **General Electric** in the Thermo-Tector, an exclusive feature on its Tri-Clad 55® three phase induction motors up to 125 h.p. frame sizes 254U to 445U. Two miniature heat sensing switches buried in the stator windings, connected in series with the conventional motor control shut the motor off whenever internal windings exceed a predetermined temperature level.

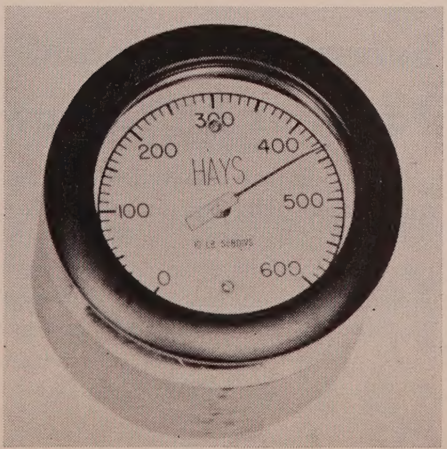
Circle item #31 on reply card.

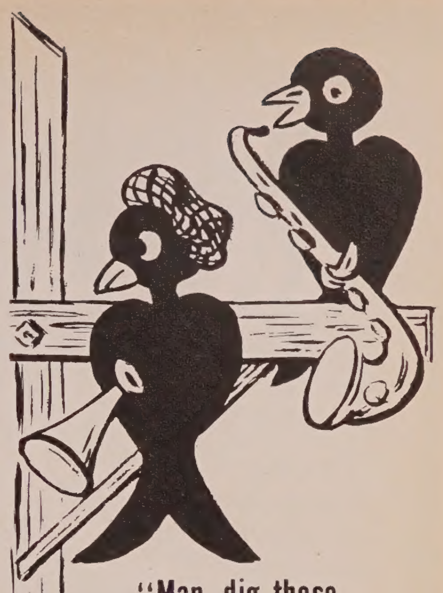


Remote Receiver

Great speed of response (2.5 seconds for full scale travel or better) is possible with an all-electric remote receiver for remote indications of gas and liquid pressure, temperature and liquid level, draft, flow, etc. Sensitivity is 0.1 percent of full range or better, with calibrated accuracy for flow being ±1 percent of full range scale. Offered in three sizes by **The Hays Corp.**

Circle item #32 on reply card.




"Man, dig these
sturdy Haley poles!"

Haley's

CEDAR POLES
and
FIR CROSS ARMS

Light in weight and clean. PENTAchlorophenol treated in our modern plant for protection against decay, moisture and insect damage.

TWO strategically located yards:
MINNEAPOLIS, MINNESOTA
FINDLAY, OHIO

R. G. HALEY & CO.
SPITZER BLDG.
TOLEDO 4, OHIO

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Fine Fanner Superformed Products

"Superforms* sure fill the bill for a STANDARDS ENGINEER!"

"Fanner Superformed products meet our standards all along the line . . . *technical superiority, accurate manufacture, uniform quality, dependable performance.*"

More and more Standards Engineers . . . *the men who must find BETTER ways to do things BETTER* . . . are testifying that Superforms meet the highest standards. A-1580A

FANNER Superformed* with a "PROTECTIVE TWIST"

ARMOR RODS . . . Protect long-span T&D lines at supports

LINEGUARDS . . . Protect short-span T&D lines at supports

PATCH RODS . . . Repair damaged conductors

TAP ARMOR . . . Protects conductor at tapping points

FANNGRIPS . . . For dead-ending strands and conductors

FANNSPLICES . . . Join two ends of conductor wire

PLASTIC PRODUCTS . . . For conductor surface protection

FANNER
The Fanner Manufacturing Co.
Brookside Park—Cleveland 9, Ohio
Division of Textron, Inc.

SUPPLY FACILITIES

Test Set Provides Improved Data

Highly automated test set at GE's medium a-c motor and generator department in Schenectad was built by the company's high voltage specialty transformer department. It was designe specifically for high potential insulation testing.

A highly automated test set which almost thinks for itself has been put into operation by General Electric's medium a-c motor and generator section in Schenectady, N. Y.

According to GE engineers, the new test set provides improved quality information by automatically registering both the time and voltage at which insulating material under test fails. The equipment was specifically designed for high potential testing of Polyseal coils used in motor generators.

In operation, the motor-operated, variable-voltage control raises to a specified voltage at 500 volts pe second, stops, and a timer measure the testing cycle. It then returns t 0 voltage position and de-energize itself.

In the event that insulation unde test fails, voltage control return automatically to 0 voltage positio and de-energizes itself. A red signa lights, indicating a failure, and th failure voltage remains recorded o the kilo-voltmeter.

The equipment is rated 25 kv o 12.5 kv at 5 kva and is mounted o a rubber-wheeled truck for eas mobility.

Expand Westinghouse Semi-Conductor Facilities At Youngwood

Westinghouse Electric Corp. has announced plans for a new building that will expand the facilities of the company's semi-conductor department at Youngwood, Pa. The new expansion will add about 30 percent more space and provide needed additional laboratory and manufacturing area.

The new plant will be primarily devoted to the development an processing of semi-conductor materials including new forms of silico and germanium. Certain areas o the laboratory will be used for pilo production. Other areas will be designed for sensitive chemical operations. Certain activities of th department's manufacturing-engineering laboratory will also b moved to the new plant.

The Youngwood plant has been active in the development of thermo-electric materials and the production of thermo-electric devices.

SALES BRIEFS

Allen Electric Co., Cleveland, has been named a distributor for **Allis-Chalmers** control equipment in Lorain, Cuyahoga, Lake, Geauga, and Ashtabula counties in Ohio.

Hawaiian Electric Company's subsidiary, **Honolulu Electrical Products Co., Ltd.,** has been appointed exclusive representative for **Multi-Amp Electronic Corp.,** manufacurer of high-current, low voltage est units.

utler-Hammer has opened branch ales offices in Peoria, Ill.; San Digo, Calif.; and Wichita, Kan.

EGULATORY . . .

om page 52

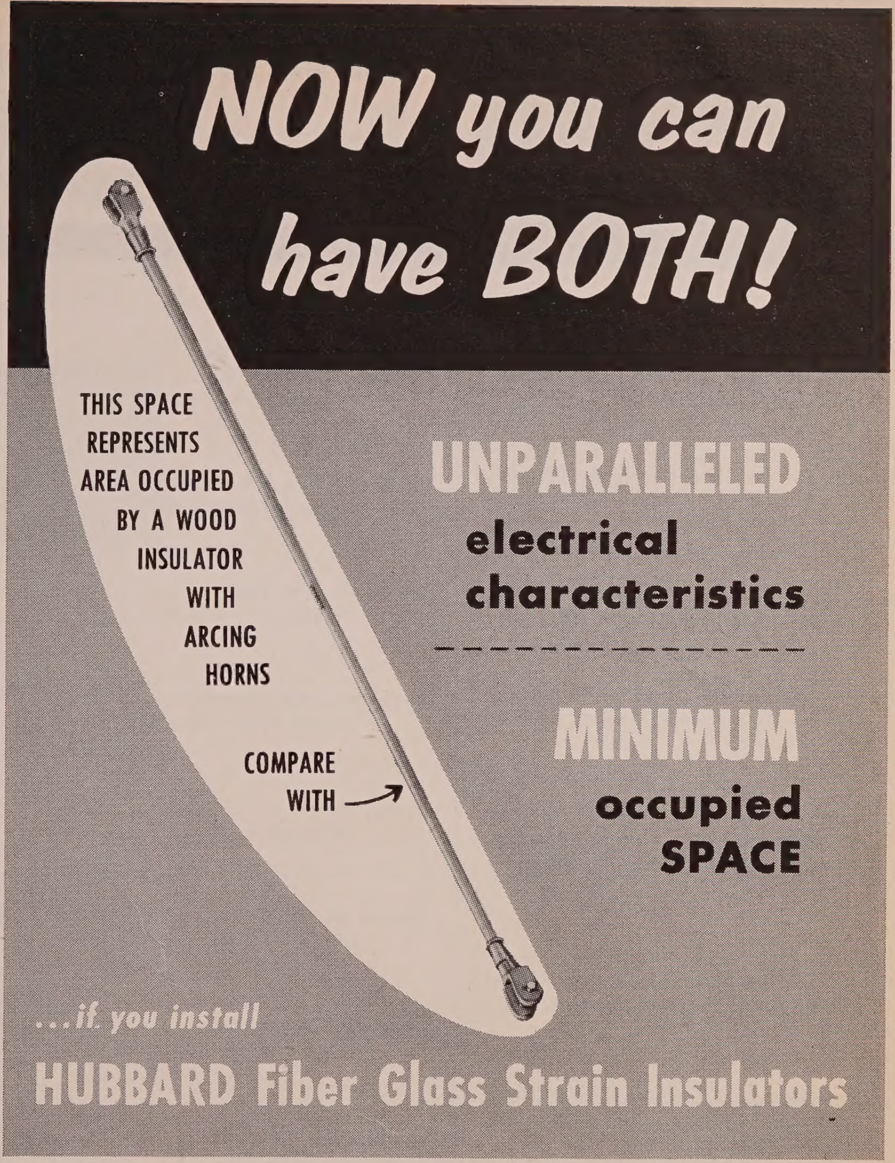
ayers, he further noted that:

"Utilities appearing in these proceedings, however, advocated a further sharing of benefits with ratepayers, in effect, by paying interest on the contingency fund, which interest would accrue to the ratepayers' benefit in determining future rates."

The dissent further noted that ongressional intent would be warted if utilities were not peritted to normalize taxes. He said part:

"It follows therefore, that, unless California utilities are permitted to compute taxes for ratemaking purposes on the 'normal' method of 'straight-line remaining life' depreciation while actually paying Federal income taxes on an accelerated depreciation basis, there will be no additional 'internally generated funds' with which to help meet expansion needs. Denying California utilities the right thus to take advantage of this Federal statute is to thwart the will of Congress in this particular."

A petition by the Southern Calirnia Edison Company for a rearing in this case was denied by e Commission by a 3 to 2 vote.


NOW you can have BOTH!
THIS SPACE REPRESENTS AREA OCCUPIED BY A WOOD INSULATOR WITH ARCING HORNS
COMPARE WITH
UNPARALLELED electrical characteristics
MINIMUM occupied SPACE
. . . if you install
HUBBARD Fiber Glass Strain Insulators

TOP CONSIDERATIONS in rating Strain Insulators dictate the choice of HUBBARD because . . .

ONE: "Unparalleled Electrical Characteristics" which mean permanently maintained, high insulation values resulting from the use of materials impervious to moisture or decay.

TWO: "Minimum Occupied Space" because *NO ARCING HORNS* are necessary. This means shorter guys, less interference with other structural components and LOWER INSTALLED COST.

BETTER PRODUCTS *through Creative Engineering*

HUBBARD
and COMPANY
200 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

CALENDAR OF EVENTS

June 2-3—Southeastern Electric Exchange, Industrial Power Sales Conference, Battery Park Hotel, Asheville, N. C.

June 5—Electric Companies Public Information Program, Steering Committee Meeting, Atlantic City, N. J.

June 6-8—Edison Electric Institute, Annual Convention, Atlantic City, N. J.

June 15-17—National Committee for Utilities Radio, 1960 Annual Meeting, St. Petersburg, Fla.

June 19-24—American Institute of Electrical Engineers, Summer General Meeting, Chalfont-Madden Hall, Atlantic City, N. J.

July 24-August 5—Columbia University, Ninth Annual Utility Management Workshop, Arden House, Harriman Campus, Harriman, N. Y.

August 9-12—American Institute of Electrical Engineers, Pacific General Meeting, El Cortez Hotel, San Diego, Calif.

September 7-9—Northwest Electric Light and Power Association, Annual Convention, Glacier Park Lodge, Glacier National Park, Mont.

September 7-9 — American Society of Mechanical Engineers, Joint Automatic Control Conference, Massachusetts Institute of Technology, Cambridge, Mass.

September 28-30—Indiana Electric Association, 51st Annual Convention, French Lick-Sheraton Hotel, French Lick, Ind.

September 29-30—Electric Companies Public Information Program, 1960 PIP Workshop Conference, Sheraton-Charles Hotel, New Orleans, La.

October 5-7—Wisconsin Utilities Association, Electric and Gas Sales and Operating Sections Convention, Schroeder Hotel, Milwaukee, Wisc.

October 9-14—American Institute of Electrical Engineers, Fall General Meeting, Morrison Hotel, Chicago, Ill.

INDEX TO ADVERTISERS AND THEIR AGENCIES

Allis-Chalmers Mfg. Co., Power Equipment Div.........**Inside Front Cover**
Klau-Van Pietersom-Dunlap, Inc.

Anaconda Wire & Cable Co.........**24, 25**
Kenyon & Eckhardt, Inc.

Basnik Co., The Vince........**84**
The Malcolm Advg. Agency

Blackburn Corp., Jasper........**73**
Ridgway-Hirsch Advg. Co.

Burndy Corp.........**6**
Ted Gravenson, Inc.

Chance Co., A. B.........**43**
Arthur R. Mogge, Inc.

Chapman Chemical Co.........**82**
Greenhaw & Rush, Inc.

Copperweld Steel Co., Wire & Cable Div.........**38**
Reuter & Bragdon, Inc.

Electro-Motive Div., General Motors Corp........**39, 40, 41, 42**
Marsteller, Rickard, Gebhardt & Reed, Inc.

English Electric Co., Ltd.........**26**
The Technical Advg. Service

Everstick Anchor Co.........**84**
Colle, McCoy, Weston, Barnett, Inc.

Fanner Mfg. Co.........**83, 86**
Palm & Patterson, Inc.

General Electric Co., Schenectady..**15, 16, 17, 18, Inside Back Cover**
G. M. Basford Co.

Goodyear Tire & Rubber Co., Industrial Products Div.........**11**
Kudner Agency, Inc.

Haley & Co., R. G.........**85**

Hotel Pittsburgher........**74**
Bachman, Kelly & Trautman, Inc.

Hubbard & Co.........**87**
Kreicker & Meloan, Inc.

Lapp Insulator Co., Inc.........**22, 23**
Wolff Associates, Inc.

McCabe-Powers Body Co.........**14**
Calvin & Co.

Moloney Electric Co.........**36, 37**
Hebert-Robinson, Inc.

Ohio Brass Co.........**27, 28, 29, 30**
Howard Swink Advg. Agency, Inc.

Pennsylvania Transformer Div., McGraw-Edison Co.........**12, 13**
Ruben Advg. Agency

Pioneer Service & Engrg. Co.........**7**
The Biddle Co.

Preformed Line Products Co.........**76, 7**
The Bayless-Kerr Co.

Sangamo Electric Co........**Outside Back Cove**
Arthur R. Mogge, Inc.

S & C Electric Co.........**34, 3**
Marsteller, Rickard, Gebhardt & Reed, In

Superior Switchboard & Devices Co.........**7**
Griswold-Eshleman Co.

Union Metal Mfg. Co.........
Griswold-Eshleman Co.

Uptegraff Mfg. Co., R. E.........**20,**
Downing Industrial Advg., Inc.

Wagner Electric Corp.........
Arthur R. Mogge, Inc.

Westinghouse Electric Corp., Pittsburgh........**32, 33, 44,**
Fuller & Smith & Ross, Inc.